FILE COPY

FILED
NOV 15 1930
CHARLES ELMORE CROPLEY
CLERK

Supreme Court of the United States

OCTOBER TERM, 1930

No. 12, Original

THE STATE OF CONNECTICUT, COMPLAINANT
v.
THE COMMONWEALTH OF MASSACHUSETTS, DEFENDANT

IN EQUITY

JOINT SUMMARY OF EVIDENCE

BENJAMIN W. ALLING,
Attorney General,
State of Connecticut.

ERNEST L. AVERILL,
Deputy Attorney General,
State of Connecticut.

BENEDICT M. HOLDEN,
Special Counsel.

JOSEPH E. WARNER,
Attorney General of
Massachusetts.

BENTLEY W. WARREN,
Special Assistant Attorney
General of Massachusetts.

GERALD J. CALLAHAN,
R. AMMI CUTTER,
Special Counsel.

THE CASE, LOCKWOOD & BRAINARD CO.
HARTFORD, CONN.

INDEX

1. STATEMENT 1

2. STATISTICAL DATA 2

3. LEGISLATIVE REPORTS 4

4. PHYSICAL CHARACTERISTICS AND INTERPRETATIONS THEREOF 5
   - Dr. Frank E. Winsor 5
   - J. Waldo Smith 10
   - Ezra B. Whitman 11
   - Nathan B. Jacobs 12
   - John H. Gregory 12
   - Dr. Frank E. Winsor 13
   - X. H. Goodnough 20
   - Weston E. Fuller 20
   - Dr. Frank E. Winsor 21

5. STREAM FLOW 22
   - Dr. Frank E. Winsor 22
   - Nathan B. Jacobs 27

6. NAVIGATION 37
   - Frank E. Winsor 37
   - Nathan B. Jacobs 37
   - Jeremiah E. Beckwith 39
   - Thomas Reed 42
   - Charles R. Bacon 45
   - William H. Hill 47
   - Herman Burgi 48
   - Robert J. Noble 50

7. POWER 54
   - Nathan B. Jacobs 54
   - Ezra B. Whitman 55
   - Weston E. Fuller 56
   - William F. Uhl 57

8. AGRICULTURE 58
William H. Carrier 58
Edward A. Isaacson 60
Stancliff Hale 63
Lewis W. Howe 65
Alfred W. Hanmer 66
Raymond A. Hardin 67
William R. Dunham 68
George A. Hollister 69
Charles E. Goodrich 70
William W. Adams 71
Andrew Christiansen 73
Harold M. Newberry 74
Stipulation 75
Dr. Mont Francis Morgan 76
Walter E. Batterson 82

9. POLLUTION 85
Prof. C. A. E. Winslow 85
Dr. Willem Rudolfs 97
Robert Spurr Weston 120
Prof. Earle B. Phelps 130
George W. Fuller 141
Gen. Sanford H. Wadhams 142

10. FISH LIFE 151
Arthur H. Frazer 151
John H. Titcomb 151
Jeremiah E. Beckwith 154
Dr. Willem Rudolfs 155
Robert Spurr Weston 156
Frank E. Winsor 157

11. WATER SUPPLY AND DEMAND IN EASTERN MASSACHUSETTS 158
Agreement on Demand and Supply 158
Nathan B. Jacobs 161
Willem Rudolfs 185
Ezra B. Whitman 190
John H. Gregory 195
Prof. Charles E. A. Winslow 201
Dr. Frank E. Winsor 215
X. H. Goodnough 217
Augustine X. Dooley 230
Charles D. Howard 234
Percy R. Sanders 235
William F. Sullivan 236
Samuel Hoar 236
George A. Bates 237
Joseph A. McCarthy 239
N. Leroy Hammond 241
Karl R. Kennison 243
William F. Uhl 254
James F. Sanborn 257
Frank A. Barbour 262
Edward L. Woodworth 272
Weston E. Fuller 273
Harrison P. Eddy 277
George W. Fuller 291
J. Waldo Smith 298
Excerpts from Knowles' Report to City of Lawrence 301

12. QUALIFICATIONS OF EXPERTS i
Nathan B. Jacobs i
Ezra B. Whitman iii
Willem Rudolfs vi
Prof. C. E. A. Winslow viii
John H. Gregory ix
Dr. Mont Francis Morgan xv
Frank E. Winsor xvii
Robert Spurr Weston xviii
Prof. Earle B. Phelps xxiv
X. H. Goodnough xxv
Karl R. Kennison xxix
James F. Sanborn xxx
Frank A. Barbour xxxi
Weston E. Fuller xxxiv
Harrison P. Eddy xxxvi
George W. Fuller xli
J. Waldo Smith xliv
Joseph A. McCarthy xlv
Charles D. Howard xlvi
William F. Uhl xlvi

In the
Supreme Court of the United States

OCTOBER TERM, 1930

Original No. 12

IN EQUITY

THE STATE OF CONNECTICUT, COMPLAINANT

v.

THE COMMONWEALTH OF MASSACHUSETTS

JOINT SUMMARY OF EVIDENCE

STATEMENT WITH RESPECT TO THE SUMMARY OF THE EVIDENCE

This joint Abstract of portions of the record, submitted by counsel for both parties, is designed to summarize within a reasonably small compass the evidence introduced upon issues on which The Special Master has made findings, to which the Complainant has taken exception. Both parties desire to reserve the right, for the purpose of amplifying this summary, to refer specifically in briefs and in argument to original exhibits and to the original transcript of the evidence, even though such exhibits or such portions of the evidence are omitted from this Summary by inadvertence or for the purpose of condensing the record.

STATISTICAL DATA

The following statistical data has been agreed upon by both Connecticut and Massachusetts.

Watershed of Connecticut River tributary to river at Massachusetts-Connecticut state line near Thompsonville (Transcript p. 111, Exhibit D-4; see Exhibit C-9) 9,722 sq. miles

Drainage area Connecticut River watershed in Connecticut (by substracting 9,915 from 11,300) 1,385 sq. miles

Total drainage area of Ware River (Bill, p. 5; Transcript p. 131) 221 sq. miles.

Drainage area of Ware River at point of diversion (Reprint of answer, p. 11; Transcript, p. 131, Exhibits D-4, C-9) 98 sq. miles.

Total drainage area of Swift River (Bill, p. 5; Transcript p. 131) 213 sq. miles.

Drainage area of Swift River at point of diversion (Reprint of Answer, pp. 21, 85; Transcript, p. 131, Exhibits, D-4, C-9) 186 sq. miles.

Drainage area of Swift River at Bondsville (Reprint of Answer p. 93; Transcript, pp. 105, 132) 195 sq. miles.

Population of cities and towns in the Metropolitan District now actually using water from the Metropolitan supply (1928 estimate, Transcript, pp. 175, 176) 1,465,740

Population of Metropolitan Area about Boston (including all cities and towns entitled to join the Metropolitan District. Transcript, p. 133; Reprint of Answer, pp. 19, 20, 21) 1,900,000

Population of Connecticut in 1925. (U. S. Bureau of the Census, 14th Census, 1920, vol. 1, p. 20; Transcript, p. 133) 1,380,631

Population of Connecticut in 1928. (U. S. Bureau of Foreign and Domestic Commerce. Statistical Abstract of the United States, 1929, p. 7; annual midyear estimates by States, Trans. p. 133) 1,667,000.

The total drainage area of the two rivers subject to diversion is 2.93% of the total watershed of the Connecticut River above the state line. (Ware River, 1.01%; Swift River, 1.92%; Transcript, pp. 139,140)

The mean annual discharge of the Connecticut River at the Massachusetts-Connecticut state line is 17,000 cubic feet per second. (Transcript pp. 137, 656)

The average net diversion from both the Ware and Swift Rivers under the War Department's restrictions is 2 per cent of the mean annual discharge of the Connecticut River at the Massachusetts-Connecticut state line. (Transcript pp. 1417-1418, 656)

Total amount of stored water to be released from the Swift River Reservoir under the War Department restrictions which would actually increase the flow which would otherwise exist in the Connecticut River would average about 146 million cubic feet per year or .03% of the average annual flow of the Connecticut River at the state line. (Transcript, p. 1420).

MASSACHUSETTS LEGISLATIVE REPORTS

Three reports of the Massachusetts legislature were introduced in evidence, viz:—

House Document 500 (1895)—Exhibit C-3
House Document 1550 (1922)—Exhibit C-1
House Document 900 (1925)—Exhibit C-2

Copies of these reports are on file with the Clerk of this Court. Counsel for either side may in their briefs summarize these reports or quote from portions thereof, if necessary, upon the argument of the Complainant's exceptions to The Report of The Special Master.

It is agreed that the Reprint of the Answer contains true copies of the Massachusetts legislation (St. 1926, c. 375 and St. 1927, c. 321); true copies of the correspondence (therein quoted) between The Metropolitan District Water Supply Commission and various officials of the War Department; and true copies of the War Department findings. These documents were introduced in evidence.

PHYSICAL CHARACTERISTICS AND INTERPRETATIONS THEREOF

DR. FRANK E. WINSOR, Chief Engineer of the Metropolitan District Water Supply Commission, testified (89, 197) that the tunnel now under construction between the Wachusett Reservoir and Coldbrook on the Ware River, is of horseshoe shape 12 feet 9 inches by 11 feet wide, having a cross section equivalent to the area of a circle with an internal diameter of 12 feet 9 inches; that the tunnel is entirely through rock, and is to be lined throughout with concrete; that legislation under which the work is being carried on contemplates no storage of water on the Ware River and no diversion of water except when the flow in the Ware River exceeds 85 million gallons a day from 98 square miles, quite a moderate flow and about the flow ordinarily developed for the use of mill wheels on the Ware River; that the Massachusetts legislation contemplates extending the tunnel from the Ware River to the Swift River, some 10½ miles further and building a reservoir in the valley of the Swift River by the erection of two dams, one on the main stream and one on the side of the proposed reservoir where the ground is too low to hold the water in the reservoir; that the Swift River reservoir will serve not only to store Swift River water but also surplus Ware River water; that the capacity of the tunnel already built will be about 900,000,000 and some odd gallons a day, and assuming that the tunnel from Coldbrook to the Swift River is built the same size, its capacity will be about the same, under most favorable conditions, which depend upon head or pressure actually effective; that inasmuch as the point of diversion on the Ware River is higher than either the Wachusett reservoir or the proposed Swift River reservoir, water can be diverted in either direction from the Ware; (197) that if water were being diverted from the Ware River in both directions (i. e. both to the Wachusett Reservoir and to the proposed Swift River reservoir) the total maximum capacity of the two tunnels to divert Ware River water only would be 1,900 million gallons a day; that the tunnel, both so far as already built,

and if completed through to the Swift River at the same size, might not be large enough to take care of the flow which might be sent through it under the following circumstances; (1) when there is as high a flood on the Ware as might reasonably be expected in the light of the records of floods since 1913, and of a flood on the Nashua River of 9600 cubic feet per second in 1898, (691) (Dr. Winsor testified, however, that since 1913 there has been no flood on the Ware too large for the tunnel to handle); (691) (2) when the Wachusett Reservoir is full and it is desired to send Ware River water to the Swift River Reservoir to be stored at times of very high water on the Ware River watershed; (3) when the Wachusett Reservoir has been drawn down to a very low point for cleaning or repairs and it is desired to send large quantities of water through the tunnel from the Swift River Reservoir in order to fill the Wachusett Reservoir rapidly; that the diversion dam at Coldbrook that is being designed to divert the flood flow of the Ware River into the Wachusett aqueduct is designed large enough so that the spillway will carry 20,000 second feet safely without injury to the dam; that if there were a flood of half that, nowhere near that amount could be taken through the tunnel in both directions; (211) that the spillway has been designed to take care of a greater quantity of water than the maximum flood records show has ever occurred there; that the tunnel has been designed to make sure that none of the Ware River waters get away; (693) that the Massachusetts legislation authorized the construction of a temporary diversion dam in the valley of the Swift River before the main reservoir is built or before time would permit its building; that the plan would involve extending the tunnel at the same gradient to the valley of the Swift River near Quabbin Lake in the town of Greenwich, where the tunnel would end; (694) that the drainage areas tributary to this tunnel at Quabbin Lake are small and it was found that the middle branch of the Swift River which comes down east of the Prescott peninsula could easily be forced back into Quabbin Lake by building a small diversion dam (which is the temporary diversion dam referred to in the act)

slightly below the junction of the East and Middle Branches of the Swift River, which would force the waters back into Quabbin Lake and thence into the tunnel; that water could be taken under this temporary diversion only at such times as the War Department permitted; that it has not yet been decided whether or not this temporary diversion will be undertaken; that it is a diversion which might not last more than four or five years and would enable the postponement of heavy expenditures on the big reservoir; (693) that during the time when the plan for the temporary diversion (authorized by Mass. St. 1927, c. 321, Sec. 1, Reprint of Answer, p. 52) of the waters of the East and Middle Branches of the Swift River is in force, the tunnel capacity will be taxed; that, inasmuch as there would be no storage back of the temporary diversion dam, in order to take all the water available during a freshet on the Swift River it must be taken while the freshet is still in progress and it is necessary to have tunnel capacity sufficient to send immediately all water diverted under the temporary scheme through the tunnel to the Wachusett Reservoir; that the diversion dam would be a very low one; (696) that the War Department has not yet passed upon the temporary diversion and no formal authorization has been issued by the War Department to erect the temporary dam; (697, 698) that about 18% of the time there would be more water available under the temporary diversion project than could be carried through the tunnel to the Wachusett Reservoir at times when floods from the Ware River had to be diverted at the same time, because during the continuance of the temporary diversion the tunnel from Coldbrook (on the Ware River) to the Wachusett Reservoir would have to carry the flood flows, not only of the Ware River, but also of the Swift River, as there would be no storage available for these waters except in the Wachusett Reservoir; that a tunnel of this size, he said, must have capacity sufficient for a considerable degree of elasticity in operation in order to take care of all contingencies which may arise; (686, 687, 690) that the tunnel is large enough to take care of additional water if in the future

the freshet flows of further tributaries of the Connecticut River are diverted, and that the possibility of taking such water in the future was one of the elements considered in the size of the tunnel, although the tunnel was designed primarily for the purposes of the Ware-Swift project alone; (687) that in his opinion a tunnel of one-half the capacity would cost only about 15% less, *i. e.* a smaller tunnel, having a diameter of 9 feet with one-half the capacity, would cost 85% of the price of the 12-foot 9 inch tunnel now under construction; (compare transcript pp. 1170, 1171). (18), (20), (700), (715) that the precise size of the Swift River Reservoir had not as yet been determined; (700), (702), that various reservoir capacities have been considered by the Commission, including one at elevation 500 feet above mean low water in Boston Harbor having a capacity of 215 billion gallons, one at elevation 515, having a capacity of 318 billion gallons, (717) one at elevation 530, having a capacity of 420 billion gallons; (700) that in his opinion a flow line between 500 and 515 would be the best height for the reservoir, as it provides at very moderate expense for exceedingly long time storage, and inasmuch as long time storage has been practically the main dependence for assuring pure water for the Metropolitan District of Boston for a generation (704) the additional cost of raising the flow line of the Swift River Reservoir from 500 feet to 515 feet of about $1,250,000 would be well expended, that the cost of raising the flow line of the reservoir from 515 feet to 530 feet would also be $1,250,000 (701) that these additional costs represent practically all the cost involved in raising the flow line, between the points indicated, including not only the cost of construction, but also the cost of additional real estate needed in raising the reservoir from 500 feet to 515 feet amounting to about $150,000 and (702) in raising the reservoir from 515 feet to 530 feet about $250,000;

(204, 206) that a very large amount of land not actually flooded, would have to be acquired, regardless of what the elevation of the flow line might be, because of the necessity

of protecting the drainage area of the reservoir from possible contamination; that surveys for a reservoir on the Swift River have been made and considerable property has been purchased; (17) that something over 35,000 acres of land, which is approximately 60% of what is contemplated being acquired for reservoir purposes, have been acquired; that he includes in reservoir purposes such land as is deemed essential to provide for the sanitary protection of the reservoir,—that is, the marginal strip around the reservoir; (205) that the total amount which may be acquired for reservoir purposes is about 60,000 acres which is practically 90 square miles;—that that includes large areas outside of the reservoir (206) for the protection of the purity of the water; (204) that the elevation shown on Exhibit D-1 for the maximum flow line which has ever been considered for this reservoir is about 530 ft. above sea level; (206) that at that elevation the reservoir will occupy probably 39 square miles; (204, 205) that the fact that the large number of peninsulas (particularly the large Prescott peninsula, which stretches right down the middle of the proposed reservoir from north to south) will have to be acquired in their entirety, (206), that whatever elevation of water in the reservoir may finally be selected, taken together with the fact that the land around any of the proposed flow lines rises very steeply and rapidly (202), means that an increase in the height of the dam and of the capacity of the reservoir will require only a small amount of extra land; (181) that he is not competent to say whether any change in the legislation authorizing this construction, in view of the disposition of the application to the War Department for permission to take waters of the Ware and Swift Rivers, is contemplated; (182) that he knows of no report to the General Court of Massachusetts of the change made necessary in the plan due to the action of the War Department; that he is not able to say whether any is contemplated or not; that as far as his personal knowledge is concerned, he knows of no such report.

MR. J. WALDO SMITH, Consulting Engineer upon the present Metropolitan District water supply project, testified (2170) that in the spring of 1920 he was asked by the Joint Board to act as consulting engineer in the preparation and presentation of that report; (2177-2178) that in his opinion one-half to two thirds of the expense of the entire dam contemplated in the Swift River Reservoir would be for construction below the surface of the ground, inasmuch as very deep excavation had to be made in order to get to bed rock, all of which expense must be undertaken regardless of the height to which the dam is built above the surface of the ground; (2172) that in his experience with dams, aqueducts, and reservoirs he has never known one to be built too large, and that in a great many instances they are not large enough; (2182) that from his experience the Swift River Reservoir site was the best that he had ever seen; (2171) that a great deal of attention was given to available sources of supply for the Metropolitan District in the report of the Joint Board in 1922; that that board went through the same process that Mr. Stearns did in the 1895 report; that Mr. Stearns was very thorough and very capable and he laid out that district with a broad outlook to the future, with a broad policy, and that policy has been consistently followed which he thinks is the reason the Metropoliatn District has been so successful and the reason it is better than any other District he knows of; that since 1926 he has been consulting engineer for the Metropolitan District Water Supply Commission; (2177) that the reservoir and tunnels recommended by the Joint Board were to be built very ample in size and if required at some later day they would also take care of additions to that supply; (2178) that the site of the dam and reservoir does not lend itself to piecemeal construction so that it really calls for doing the work all at the same time; (2179) that these structures were designed to take care of more water than was immediately necessary; (2180) that there is no reason why other people should not get their water from this great reservoir up there that will hold this great quantity of water; that sometime Hartford or one of those cities will put

a pipe line up to the Swift River and have some of that water; that everything is along that line these days (2181) that the taking of water from other tributaries of the Connecticut River was not contemplated but was taken into consideration; that the other waters that can be put into the Swift River reservoir would be the Millers, Deerfield, Quaboag, and Westfield; that those are the ones that must be the next step in the development of the Ware and Swift.

MAJOR EZRA B. WHITMAN, expert for Connecticut, testified (344-345) that from the evidence given by Dr. Winsor, he believed that the Massachusetts construction work which has been done to date has followed very closely the recommendation in House Document (1922) No. 1550, Exhibit C-1; that from his experience in water supply engineering he would say that construction work being carried on in the construction of the tunnel and to be carried on in the suggested construction of the reservoir of the Swift River is far beyond what is necessary for the development of the Ware and Swift Rivers, in accordance with the legislation of 1926 and 1927, excepting where that legislation states that the works may be made big enough to take in other streams in the future; (1170) that in his opinion a higher dam would be much more expensive than a lower one, because it would require the acquisition of more land and additional foundation construction; that he estimated the cost of a tunnel of one half the capacity of that now under construction would be seven-tenths of the cost of the larger tunnel; (351-358) that the logical and sensible way of making use of the construction which he regarded as excessive, would be to take in the future additional waters from nearby and adjacent rivers, such as the Millers, Quaboag, Westfield, and the Deerfield Rivers, and divert them into the reservoir; that from his examination of the record of the flow of the Ware River from 1913 to date, the largest daily flow recorded by any flood during that time was 1375 cubic feet per second; that under

the legislation 131 cubic feet per second must be let down the Ware River, and that the remaining 1244 cubic feet per second could be carried by either the Ware-Swift tunnel, or the Ware-Wachusett tunnel with a 10% margin of excess capacity; (347) that he has made computations to show what amount of storage would be required if the City of Boston were going to take all the water from the Swift and Ware and not let any of it down; that without knowing the exact area of the land that would be flooded it is necessary to make more or less assumptions as to the percentage of the total watershed that will be under water; that his computations show that if there is five percent of the area covered by the reservoir that you can get practically complete development or yield of one million gallons per day per square mile; that the complete development would be 1.05, that is, the entire runoff per square mile is 1.05 million gallons per day; that it would require, with five percent water surface and 95 percent land, a reservoir of 140 billion gallons capacity to practically completely develop the watershed, and the yield would be (348) 270 million gallons per day.

MR. NATHAN B. JACOBS testified that the tunnel under construction as Dr. Winsor described it as to size and capacity, is practically the same as was indicated in the 1922 report (Exhibit C-1); that he does not think there has been any departure; (250) that the black line on Exhibit C-1 in the Swift River area defining the maximum flowed area in the Swift valley as testified by Dr. Winsor is the 1922 recommendations; that what he was testifying to as to the general plan of Massachusetts is practically the same as the 1922 recommendations.

DR. JOHN H. GREGORY, an expert witness called by Connecticut, testified (1263) that he believed a total storage of only 140 billion gallons in the Swift River reservoir would be

necessary to develop adequately the total water supply yield on the Ware and Swift Rivers, above the points of proposed diversion; that he did not believe that a reservoir holding 400 billion gallons would be necessary; that in his opinion a considerably smaller one would serve to take all the water; that the most practical place from which to acquire more water for the Swift River Reservoir would be from the watersheds in the vicinity of that reservoir, because it would not be practical to take Eastern Massachusetts supplies and pump them over to the Swift River Reservoir.

Several Massachusetts witnesses on cross-examination were questioned as to what in their opinion would be the method adopted by Boston for obtaining a further supply when the Ware-Swift project had become inadequate.

DR. FRANK E. WINSOR testified that how long before 1970 this would become important would depend, (725) upon the sources which might then be available and the length of time required to investigate them and to develop them; (721) that he estimated the Ware River Supply to last with reasonable safety until 1934, assuming that the water can be taken in 1931; that he stated that the area of the watershed above the proposed temporary diversion dam on the Swift River is 127 square miles; (723) that discussing informally with the District Engineer of the War Department the informal suggestion was made that water might be taken in this temporary way whenever the flow at West Ware on the Swift River exceeded 100 cubic feet per second; that on that assumption, he is under the impression that an additional yield of something like 35 million gallons a day on the average could be obtained; that with this, storage in the Swift River Reservoir ought to begin about 1940 so that (724) storage would be available a year or two later, he figures that the capacity of all these sources would be reached approximately by 1970, that

is including the waters of the Ware and Swift; that he gave as an estimate that investigation would begin from ten to fifteen years before the date when the Ware-Swift supply actually became inadequate; that he testified that (176) while the towns outside the Metropolitan District come into the Commission, some of the water supplies which these towns have, have outlived their usefulness; that they are from polluted waters; and are inadequate and the probability is that they (177) would be abandoned when they came into the Metropolitan District; that when the Metropolitan District takes in the additional population, the District will not necessarily take over the water supplies now used by this population; that they may abandon that supply when they request to come into the District; (178) that he has no plans as to what will be done with this water supply that will be discontinued; that it doesn't come under his jurisdiction; that he hasn't made any study to enable him to advise as to its ultimate destination; that as a rule those supplies are nearing the end of their usefulness; that they are obtained from waters that are polluted by large population and the reason for their abandonment is generally because of their unsuitability; that as to what they are going to do with that water, there is no reason why that should be of any interest to him; that it is of interest to the municipalities themselves; that when they think it is unsuitable, then they may come in; (179) that he has nothing whatever to do with looking over any water supply in any community to see of what use it can be made and that he doesn't know anyone who has—if they do, he doesn't know who it may be; (725) that fixing from 10 ot 15 years before 1970 when an investigation for a new supply will begin, he took into consideration the abandonment of the Cochituate supply first, probably the abandoning of the Ashland supply later, or the Ashland Reservoir; that practically it does include the abandonment of the supplies of these towns that are now supplying themselves, that are within the ten mile radius; that though he hadn't thought of it in just those terms but that is what it would amount to.

(1221) Q. If that Metropolitan District had to supply these other areas, you have exhausted their supply at the same time? A. The presumption is that the supplies have become inadequate.

Q. If that is so, then the Metropolitan District is faced with either going to the Merrimac or to these supplies in the other portions of Eastern Massachusetts that have been described as a Fifteen Watershed Plan, or the Ware and Swift, isn't that true? A. They have certainly got to get additional water.

Q. And in one of these three sources? A. They have got to get additional water, that is true.

Q. That is the three sources that are available, of water, normally in Eastern Massachusetts? A. I would say that you combed Eastern Massachusetts to the limit.

Q. So you have three distinct—

MR. WARREN. There is the Charles River, isn't there, Dr. Winsor?

THE WITNESS. There is the Charles River.

Q. Well, then, do you consider that a source of supply? A. I do not.

Q. No, so that from your standpoint you really have three distinct sources of supply, haven't you? A. I wouldn't agree with that. I don't consider that they are the only possible sources.

Q. But that is the maximum, isn't it? A. Possibly.

MR. WARREN. No, the Charles.

Q. You might question these two, you might question some of these other sources, but that in general is a description of what there is possible of development, if they can be developed? A. Well, if that problem was put up to me (1222), I would have to give it very careful consideration and very long study. That is, whether I would want to consider getting water from wells, or Martha's Vineyard, or at the North End of Cape Cod.

Q. Or the North Pole? A. Or the North Pole.

Q. Now, Dr. Winsor, you say that you are within ten gallons less.

Mr. Warren. What?

Q. Ten million gallons per day less on your estimate for 1970? A. If the Cochituate and parts of the South Sudbury are not in use.

Q. So that when that point is reached you must go somewhere else for water? A. If the District continues to grow beyond the limit.

Q. And there are no sources in Eastern Massachusetts that you would go to? A. Well, that is a question that would have to be solved in 1940.

Mr. Warren. 1970?

The Witness. 1970, I should say, in 1970.

Q. It will have to be solved much quicker than that, will it not, if you are going to be short ten million gallons per day in 1970? A. Well, I don't think that you could delay the solution as long as that. I think the future supply ought to be available in 1970. You might have to decide ten years before.

Q. I think you said from 10 to 15 years earlier? A. Ten to fifteen years earlier, that is it, of course.

Q. Would you expect to put in the eastern waters into the Swift reservoir? A. From the eastern part of the State?

Q. Yes. A. Why, I would not expect to, as far as I see the problem offhand. I haven't faced that problem. I wouldn't think so.

Q. (1223) So that if you wanted, then an additional supply, and if the Swift reservoir is to be used, it necessarily largely must come from the western past of the State? A. Well, I would not say that the Swift reservoir—the Swift reservoir would continue to be used anyway, wherever the additional supply might come from. It might come from wells alongside of the Charles River. By that time we might be distilling ocean water.

Q. Have you wells alongside the Charles River? A. I have never— I was just—

Q. So that they are not going to go in, and isn't it true—

Mr. Warren. Dr. Winsor, do you mean to say there are no wells along the Charles River?

THE WITNESS. There are many wells along the Charles River, but we haven't got them. I mean the Metropolitan District hasn't.

MR. WARREN. You must be very careful in answering Mr. Averill's questions to, because I don't think he is always directing his questions to the Metropolitan District. He is talking about the eastern part of Massachusetts. Now the Charles River at the present time, as I understand the situation, has some wells which supply at least in part the town of Brookline and the City of Newton, don't they?

THE WITNESS. Yes, and in addition to that they supply Waltham and Dedham and possibly some others.

MR. WARREN. They don't take the water from the river?

THE WITNESS. No.

MR. WARREN. But they take it from wells?

THE WITNESS. From wells.

MR. WARREN. Driven in the valley of the river?

(1224) THE WITNESS. They have got a very considerable supply from those wells.

Q. (1236) (By Mr. Averill) I think, Dr. Winsor, just before the *Mayor* went on, either you or Mr. Warren were talking about some wells, a considerable well development along the Charles River. How extensive is that development? A. I really cannot tell you. I never have been connected with that. I know in Newton, where I live, we get well water from the Charles. I know that Brookline, Waltham, Needham and Dedham, and I presume other places, take water that travels along the Charles River.

Q. Are those towns included within any of the district which you outlined today, either in the 13 towns, the 10 towns or the 20 towns? A. They are all included in one or the other of them.

Q. Do you figure on using these supplies after the Metropolitan District takes it over? A. A part of this available water that I spoke of would undoubtedly come from those supplies.

(1237) Q. Isn't it true Dr. Winsor, that when you reach your capacity or your demand by 1970, or before that, your next supply must come either from tributaries of the Connecticut River or the Merrimac River or the area included within this Fifteen Watershed area? A. Speaking generally, without having given that matter mature consideration, I would say no. There would be other sources.

Q. What are they. A. Lake Winnipesaukee, Lake Sebago—

Q. Lake Winnipesaukee is where? A. It is in New Hampshire. It could not be taken now.

Q. That is a possible source? A. It has so been considered for the last 40 years.

Q. Where is Lake Sebago? A. That is in Maine.

Q. Have you any other sources in Massachusetts other than those I have mentioned? A. I do not suppose—

Mr. Warren. Did you mention the Charles?

Mr. Averill. I did not. He said that was not considered.

A. (Continuing) I do not suppose that large quantities of water could be obtained economically from other sources in Eastern Massachusetts, although I would say if you are willing to pick it up in a dozen or 15 or 20 places, a few bucketsfull at a time, the same as this Assabet project, it could be done. It would be poor engineering but it might be possible. Without investigation I could not say.

Q. So that it limits you to the Merrimac or the tributaries of the Connecticut River for the future supplies of the Metropolitan District? A. No.

(1238) Q. What are the others? A. I mentioned some others.

Q. You would have to go to New Hampshire, Maine or the Connecticut River tributaries? There are no other available sources? A. Yes; I think there are probably

other available sources. I think the Hazen report mentioned other available sources.

Q. In Eastern Massachusetts? A. They are in Eastern Massachusetts, but I think they are interstate waters.

Q. There are no purely Massachusetts supplies other than those I have mentioned? A. Other than those you have mentioned and I have mentioned, that may be so. I have mentioned the possibility of picking it up in a dozen or more of these little puddles that fill up after a rainfall.

(1240) Mr. Warren. On page 123 of House No. 900 I find this, in the Hazen report: "Supply for Merrimac River Communities. Ipswich River developed as proposed can be used for Lawrence, Lowell and other cities in the Merrimac River district. It is considered, however, that Salmon Brook and adjacent areas, mentioned above, will probably give a more economical and satisfactory service to those cities, and this matter is not followed further."

And the Commission itself, in its report on page 40, under the heading "Proposed Alternative Plan," said:

"We are in accord with views expressed in the report of the Joint Board,"—

that was House No. 1550 of 1922—

"With reference to the desirability of eliminating from consideration the possibility of developing new supplies from such sources as the Merrimac River, Charles River, Shawsheen River, or the other watersheds heretofore frequently suggested but which are located outside of the State."

Mr. Averill. What is the rest of that paragraph?

Mr. Warren. "There are, however, some available additions of substantial amounts which can be made to the present Metropolitan Water Supply from comparatively nearby sources which will render it possible to defer encroachment upon (1241) territory in the west-

ern portions of the State for a considerable period."

Q. Now, Mr. Winsor, you heard that excerpt from page 40 read? A. I did.

Q. Have any of those "available additions of substantial amounts" been developed since this report was made, in Eastern Massachusetts? A. No, not to my knowledge.

MR. X. H. GOODNOUGH, since 1895 Chief Engineer of the State Department of Health of Massachusetts (1566), after testifying that the Ware-Swift supply will probably last until 1970, indicated that it was impossible to state now where the Metropolitan District will get an additional supply at that distant date in the future. He called attention (1602-1603) to the possibiilty that power companies making developments in New Hampshire and Maine might cooperate with Boston in the building of great reservoirs which could be used not only for power, but for water supply purposes. He cited the case of Springfield, Massachusetts, as in instance of such a co-operative undertaking.

MR. WESTON FULLER, an expert witness, offered by Massachusetts, testified (2031) upon cross-examination that it would be a great mistake to force the Metropolitan District to take an inferior supply under the conditions which now exist; that it was not a foregone conclusion that all future water supplies of Boston must come from the western section of the State, although in his own opinion he believed that the supply for Eastern Massachusetts ought to some from sources similar to the Ware-Swift, and that he believed that these sources could be found in the western part of the State; that he also stated he believed that the tendency of water supply experts was to overestimate the rapidity with which additional supplies would be needed, and that in his opinion the Ware-Swift supply would go for a few years beyond 1970; that he gave it as

his opinion (2032) that, if Massachusetts did go to other tributaries of the Connecticut River and if the War Department required Massachusetts to let down more water than naturally goes into the Connecticut in dry seasons, that it would benefit conditions in the Connecticut River.

DR. FRANK E. WINSOR testified (87) that the first contract was let for shafts in the spring of 1927; that in the spring of 1928 the contract or two contracts were let for the tunnel, the tunnel being divided into two parts extending from the Wachusett Reservoir; (88) that bids were opened in the fall of 1927 and the contract was made in the early part of 1928; that it was made as soon as the War Department acted on the Ware River application; (715) that up to this time the delay which might have been occasioned because both projects had not been undertaken simultaneously and contracts let simultaneously for the whole project, has not cost any additional money; that up to date, the Commonwealth or the district has not been in any way inconvenienced on its water supply; that the construction of the tunnel westerly from Coldbrook will become an important matter very soon because of the fact that the increment which may be expected in water supply from the Ware, will not carry the District for a much longer period that it will take to complete the tunnel, so that the construction of that tunnel from his viewpoint, as an engineer should be underway very shortly.

STREAM FLOW

DR. FRANK E. WINSOR, an expert witness for Massachusetts, testified (107) that a chart entitled "Relation of Authorized Diversion to the Flow of the Connecticut River in the Dry Year 1923" (Exhibit D-2) shows on the left-hand side the diversion authorized by the Massachusetts legislation, and on the right-hand side that authorized by the War Department; that the chart is meant to show a weekly hydrograph of the flow of the Connecticut River; that each horizontal line shows the amount of water in cubic feet per second that would have flowed in the Connecticut River on an average for each week during that entire year; that the heavy black area at the top of each of these peaks shows the amount of water which would have been abstracted from the Connecticut River during each week of that year under Massachusetts legislation; that the graph is prepared for the flow of the Connecticut River at the Massachusetts-Connecticut state line; that the area that is section-lined represents what continues to flow in the Connecticut River, and the area in solid black represents what is taken out; (108) that in the months from July to October, inclusive, the top of the line, instead of being solid, is broken, indicating that in those weeks the Swift River was contributing water to the Connecticut River in excess of what its flow would have been had there been no reservoir; that the War Department has required Massachusetts to draw upon storage and bring the flow up above what it would be if this reservoir were not built; (109) that a similar chart shows the same thing for the wet year 1928 (Exhibit D-3); that in that year it would not have been necessary to draw upon storage because of the high flow of the river at Sunderland; that the extreme minimum flow in the wet year of 1928 is shown for the second week in October and was considerably more than 5,000 cubic feet per second; (112) that Exhibit D-4 entitled "Connecticut River Hydrograph Massachusetts-Connecticut State Line—Weekly Average Flows before Diversion and Amounts Which Could Have Been Diverted from (and added

to) the Swift and Ware Rivers under War Department Findings of March 1928 and May 1929" shows the flow of the Connecticut River at the Massachusetts-Connecticut state line; that the *black area at the top represents to scale the amount of water that would have been diverted for water supply of the Metropolitan District had the works contemplated in the legislation of 1926 and 1927 been completed, and provided that the requirements of the War Department were complied with; that where the line is full *black, it represents a positive diversion; that where there is a broken line, it represents an addition to the flow; that the graph is made up week by week beginning January, 1913; (117) that the total drainage area tributary to the Connecticut River above the point at which it crosses the Massachusetts-Connecticut state line is 9,722 square miles; (120) that during the period July, August, September, and the first part of October, 1913, the flow of the Connecticut River would have been continuously augmented by water released from storage; that during the second week in September, 1913, for example, there would have been added to the flow of the Connecticut River from storage in the Swift River Reservoir 48 Cubic feet per second during the entire week; (121) that those figures show nothing about the Ware River because during the period from June 15th to October 15th the Commission would not be permitted to take water from the Ware River; that regardless of whether the flow is above the 85 million gallons per day which, under Massachusetts legislation, fixes the point at which diversion may begin, under the War Department regulations no water could be taken during the period June 15th to October 15th; (122) that the chart shows the weekly diversion from 1913 through the first week of December, 1929, also the tides on the Connecticut River at Hartford on days when the low tide went below 3 feet on the Hartford gauge; that 2 feet on the Hartford gauge, is the elevation to which the navigable depths are usually referred; that, in other words, a 10-foot channel in

* the areas and lines appearing black on the tracing being testified to appear *white* on the blue print filed.

the Connecticut River is supposed to be 10 feet deep below 2 feet on the Hartford gauge; (124) that the tides are not shown on the chart on days when they did not go as low as three feet; (126-127) that zero on the Hartford gauge is about 0.69 feet below mean sea level; (129) that the total watershed of the Connecticut River at its mouth is 11,300 square miles; (130) that part of the watershed is in Canada; that the total watershed on the Connecticut River lying above the Massachusetts-Connecticut boundary is 9,915 square miles, including some area in Massachusetts which empties into the Connecticut River in Connecticut below the state line; that this explains the variation between 9,915, which lie above the state line and 9,722, shown on the chart, which are tributary above the state line; (131) that the drainage area of the Connecticut River watershed lying in Connecticut, by subtraction, is 1,385 square miles; that the total drainage area of the Ware River is 221 square miles and at the point of partial diversion, 98 square miles; that the total drainage area of the Swift River is 213 square miles and at the point of partial diversion, 186 square miles; (132) that the drainage area of the Swift River at Bondsville is 195 square miles; that the Massachusetts legislation prescribes that there shall be a guaranteed flow at Bondsville of 20 million gallons per day; (133) that in making up that flow, the drainage area between the dam and Bondsville contributes, so that it is not necessary, under Massachusetts legislation, to draw all of the 20 million gallons per day from storage in the reservoir but only so much thereof as is necessary to augment the flow from the 9 square miles between the dam and Bondsville to produce 20 million gallons per day at Bondsville; that the War Department requirements do not relate at all to Bondsville, but the flow stated to be released is measured at the dam; that the population of the metropolitan area about Boston is 1,900,000; that the population of Connecticut in 1928 was 1,667,000; (134) that the diversion proposed on the Ware River under the Massachusetts legislation is: Flood flow in excess of 85 million gallons per day between November 30th and June 1st of each

year, no water to be diverted between May 31st and December 1st in any year without approval of the Massachusetts State Department of Health; that under the War Department restrictions, the diversion permitted from the Ware River is: Flood waters in excess of 85 million gallons per day for the period from October 15th to June 15th of each year; (135) that on the Swift River, under the Massachusetts legislation, diversion is authorized of all waters except those required to maintain a flow at Bondsville of 20 million gallons per day; that on the Swift River the War Department authorized diversion of all waters except those required to maintain a flow at Bondsville of 20 million gallons a day, except that during the period from June 1 to November 30, both inclusive, 110 cubic feet per second shall be released from the impounded waters when the flow of the Connecticut River at Sunderland, Mass., a town about 20 miles north of the confluence of the Chicopee and Connecticut Rivers, is 4,650 cubic feet per second or less, and when said flow of the Connecticut River is more than 4,650 and less than 4,900 cubic feet per second, 70 cubic feet per second shall be released; (136) that the War Department determined that a discharge of 4,900 cubic feet per second at Sunderland corresponds to an average lower low tide gauge height of 2.1, and a discharge of 4,650 cubic feet per second at Sunderland to an average lower low tide gauge height of 2.0 feet at Hartford; that the Metropolitan District Water Supply Commission's plans are being made in compliance with the War Department's decision; that he is not intending to go beyond the requirements of the War Department; (137) that the mean annual discharge of the Connecticut River at the Massachusetts-Connecticut boundary is about 17,000 cubic feet per second and that of the Swift River at the proposed Reservoir, about 300 cubic feet per second; that the mean annual discharge of the Swift River is about 1.8 percent of the mean annual discharge of the Connecticut River at the Massachusetts-Connecticut state line; that there would be some very wet years when the only release from storage in the Swift River Reservoir would be that required by the Massachusetts legisla-

tion and that there would be other dry years when a very large release would be required by the War Department; (139) that the drainage area of the Ware River at the point of partial diversion is 0.87 percent of the total drainage area of the Connecticut River and 1.01 percent of the drainage area at the Massachusetts-Connecticut state line; (140) that the drainage area of the Swift River subject to diversion is 1.64 percent of the total drainage area of the Connecticut River and 1.92 percent of the drainage area at the Massachusetts-Connecticut state line; that the total watershed subject to partial diversion is 2.93 percent of the total watershed of the Connecticut River above the Massachusetts-Connecticut state line; (1418) that the flow of the Connecticut River actually diverted by the Ware and Swift project under War Department restrictions averages about 2 percent; (1416) that the average annual flow of the Connecticut River at the Massachusetts-Connecticut state line corresponding to 17,000 cubic feet per second is 542.1 billion cubic feet per year; that the average net annual diversion under Massachusetts legislation as modified by the War Department is 10.8 billion cubic feet per year, corresponding to about 300 cubic feet per second; (1418) that of this 10.8 billion cubic feet, which is the net total annual diversion, 8.1 billion cubic feet, or three-fourths of the total, is taken away when the Hartford gauge reads above elevation 7.4 or 17.4 feet above project channel bottom; that 2.1 billion cubic feet, or nearly one-fifth of the total, is taken away when low tide on the Hartford gauge stands between 3.5 and 7.4 feet; (1419) that in other words, a total of 10.2 out of 10.8 billion cubic feet, or 94 percent of the total diversion, is taken out when low tide on the Hartford gauge stands above elevation 3.5, or 13.5 feet above the project channel bottom leaving a balance of some six-tenths of a billion cubic feet of the total of 10.8 billion cubic feet, which is taken out when low water on the Hartford gauge is below 3.5 feet; that, however, if at any time low tide is below 2.1 on the Hartford gauge, which corresponds to 12.1 feet above the project channel bottom, the interests of navigation are safeguarded by the release

of stored waters from the Swift River Reservoir under the requirements of the War Department, so that the navigable depth is slightly increased at times of lowest flow; (1420) that the amount of stored water which would be released under the War Department requirements, and which will increase the flow in the Connecticut River above what it would have been without any development of the Ware-Swift diversion project, averages about 146 million cubic feet per year, or three one-hundredths percent of the average annual flow of the Connecticut River at the Massachusetts-Connecticut state line.

MR. NATHAN B. JACOBS, an expert witness for Connecticut, representing Morris Knowles, Incorporated, testified (251) that he had made a study of the stream flows of the Connecticut River and tributaries, having available for this study the same records of the United States Geological Survey in regard to stream flow that Dr. Winsor had; that records of the stream flow of the Ware River are available from August 20, 1912, of the Swift River from July 15, 1910, of the Connecticut River at Sunderland from March 31, 1904, and at Thompsonville from July 14, 1928; (252) that the hydrograph of the weekly flows of the Connecticut River (Exhibit D-4) is substantially correct; that so far as weekly flows are concerned his results are substantially the same and there is no quarrel as to the figures; that he had made a hydrograph of the Connecticut River at Hartford; (253) that there is very little difference between the two, except that Exhibit D-4 is on a weekly basis and his is on a daily flow basis; (254) that this chart (Exhibit C-5) shows the daily low water gauge heights at Hartford; that the influence of the tide reaches above Hartford up to a point where there is a dam known as the "Enfield Dam"; that when the gauge at Hartford indicates about 8 feet there is no noticeable tidal effect at Hartford owing to the great amount of water coming down the Connecticut River; but as the gauge goes down, the tidal effect is felt

at Hartford; (256) that on this chart the vertical scale is not a direct reading scale. (In the first block, that is from zero to two feet, each of the blocks represents two-tenths of a foot. The same is true in the block from two feet to four feet. In the block from four feet to nine feet each of the spaces represents five-tenths of a foot. In the block from nine feet to nineteen feet each block represents one foot. In the block from nineteen feet to thirty-nine feet each space represents two feet); that this was done so as to condense the record to a short interval of height on the chart, and at the same time to be able to show the difference in smaller amounts than a foot at times of low gauge; (258) that this graph (introduced in evidence over the objection and exception of Massachusetts) is not confined to showing the effects of the diversion only from the Swift and Ware Rivers as modified by the War Department findings, but indicates the maximum diversion in cubic feet per second from all of the Connecticut River tributaries which have been mentioned in reports upon water supply for the Metropolitan District, namely, the Swift, Ware, Millers, Quaboag, Westfield and Deerfield Rivers, assuming the same diversion from the Millers and the Quaboag as from the Ware as authorized by the Massachusetts legislation and from the Westfield and Deerfield as from the Swift as authorized by the Massachusetts legislation; that this diversion is indicated on the graph by the dotted line at river stages of 4 feet and less at Hartford; (259) that these diversions from six rivers would be four and three-fourth times the diversion from the Ware and Swift; (263) that Exhibit C-6 is a graph for the period from 1913 to 1926 showing the gauge at Hartford in feet on days when the gauge was 16 feet or more, and shows the reduction which would have occurred in that gauge on the basis of the diversions from the Swift and the Ware; that 16 feet was selected because that is the flood stage on the Connecticut River at Hartford; (267) that on March 30, 1920, the reduction in stage at Hartford would have been four-tenths of a foot or approximately 5 inches, and the river stage on that day was 22.5 feet at Hartford; (269) that the Government project for

navigation is a channel 10 feet deep below the zero of the Hartford gauge; that the project has never been carried out, the most that practically obtains is around 10.5 feet below mean low water, or 2 foot stage; (270) that there is a depth of about 10 feet of water in the river when the Hartford gauge is 2 feet; that there should be, to meet the Government project, 12 feet in the river when the gauge is 2 feet; that between Hartford and Springfield, there is no channel dredged, and when the gauge at Hartford is 2 feet, there is a depth of about 3 feet of water; (272) that on May 3, 1921, there occurred the day of maximum effect on the Hartford gauge considering those days when the Hartford gauge was more than 16 feet; that the effect on this days was a reduction of 0.55 feet, or about six and one-half inches; that on this particular day the diversion would have been the same either under the Massachusetts legislation or the restrictions of the War Department; (274) that flood water is generally defined "that which overflows the banks of a stream"; that sometimes they say that anything above the lowest annual maximum stage that has occurred over the record of the gauge is flood; (275) that the Ware River has never overflowed its banks at Gibbs Crossing, the site of the United States Geological Survey measuring station on that river, from 1913 to date; that looking at it purely from the standpoint of overflowing the banks at that particular point, there have not been any flood waters in the Ware River during this period; that the lowest high flow of any year on the Ware River was in 1918, March 24th, amounting to 547 cubic feet per second at Coldbrook; (276) that according to the rule of the lowest annual maximum stage, only the flow in excess of 547 cubic feet per second would be considered flood water; that with 547 cubic feet per second flowing in the Ware River, the line of demarcation between ordinary flow and flood flow had been reached; (277) that on that day, with 547 cubic feet per second flowing, there would have been diverted all in excess of 132 cubic feet per second, or 415 cubic feet per second, which is 76 percent of the total flow of the stream; (278) that the dictionary definition of

flood is "An unusually abundant flow of water in a stream rising and overflowing land not commonly covered with water; an inundation, freshet or deluge; flood stage, the lowest stage of a river at which overflow will begin"; (279) that in 100 square miles of drainage area, a flow of 85 million gallons per day would not be considered flood or flood waters except by special definition; (283) that Exhibit C-8 shows the daily diversions from the Ware River for 1927 under the Massachusetts legislation; that the correction for the War Department's restrictions on this river is purely one of time and would mean that if one were to consider it on the basis of the War Department's order, one would merely disregard those dates which occur between June 15th and October 15th, inclusive; (300) that Exhibit C-11 shows the daily flow of the Connecticut River at Thompsonville for the year 1923 and the diversions which would have taken place under the Massachusetts legislation from the Ware and Swift Rivers; (301) that Exhibit C-12 shows the same information for the year 1929; (304) that the solid black portion of the columns shows the ratio of the diversion to the flow of the Connecticut River; that the dotted lines show the same thing by weeks and would correspond in a general way with Exhibit D-4; (305) that in some weeks there is a wide distinction between the maximum and minimum flows and in some weeks there is not; that in the week covering the last part of October and the first part of November, 1923, the flow varied from 2,000 cubic feet per second to about 40,000 cubic feet per second; that the following week the rate of flow was from about 23,000 cubic feet per second down to as low as about 10,000 cubic feet per second; (306) that it is generally found that Monday is the day of lowest flow; (308) that Exhibit C-13 is a statement by years of the number of days from 1913 to 1927, inclusive, that the flow of the Ware River at Coldbrook would have been greater than 85 million gallons per day, the amount stated in the Massachusetts legislation; that, for example, in 1927 on 227 days out of 365, there would have been a flood in the Ware River under the Massachusetts definition of flood; (309) that

Exhibit C-14 shows the diversion under the Massachusetts legislation from the Swift River for each day during the calendar year 1927; (310) that during the year 1927 there would have been diversion from the Swift River every day but two, namely, October 2nd and 3rd; (312) that the year 1929 was a dry year, and that the year 1923 is the best example of a normal year on the Connecticut River; that 1923 was not as dry a year as 1929; that 1921 was drier than either of them; and that the very dry years were 1914 and 1915; that Exhibit C-15 shows the maximum flow of the Swift River on any day during the year for each of the years from 1913 to 1929, and the total amount of flow that would have been diverted under the Massachusetts legislation; (601) that Exhibit C-6-A shows the lowering in stage of the Connecticut River at Hartford at times when the water at Hartford stood at 16 feet or more on the gauge due to diversion as proposed from the Ware and Swift Rivers, subject to the so-called Army restrictions; that the only difference between Exhibit C-6 and Exhibit C-6-A is that the latter shows a slight reduction in the amount of diversion possible on two days, namely, July 10th and August 6th, 1915; that under the Massachusetts legislation there would have been diverted from the Ware and Swift Rivers 700 cubic feet per second on July 10, 1913, but under the Army restrictions it would have been possible to divert only 558 cubic feet per second; that August 6th, under the Massachusetts legislation it would have been possible to divert 2,134 cubic feet per second, which under the Army regulations, the amount of diversion would have been 1,610 cubic feet per second; (607) that Exhibit C-8-A shows the daily diversions from the Ware River for the year ending December 31, 1927 under the Massachusetts legislation and also under the restrictions of the Secretary of War: (609) that Exhibit C-14-A shows the daily diversions from the Swift River for the calendar year 1927 based on the Massachusetts legislation and also under the restrictions of the Secretary of War; (611) that for example, on October first of the flow of the Swift River was 112 cubic feet per second, and the Army restrictions require that

110 cubic feet per second be permitted (612) to flow and therefore there was retained in the reservoir 2 cubic feet per second of the natural flow of the stream; that under the Massachusetts legislation, there would have been diverted 76 cubic feet per second on that day; (613) that on October 2, 1927, the natural flow of the Swift River was 107 cubic feet per second and under the Massachusetts legislation, there would have been diverted 81 cubic feet per second out of this flow; which would have left 26 cubic feet per second to flow past the dam; that under the Army restrictions on this day, the natural flow of the stream would have been supplemented by 3 cubic feet per second; (614) that Exhibit C-14-B shows the daily diversions from both the Ware and Swift Rivers for 1927 both under the Massachusetts legislation and under the restrictions of the Secretary of War, and this statement is the total of the figures shown in Exhibits C-8-A and C-14-A, and is simply a matter of addition; (615) that Exhibits C-23-A, C-23-B and C-23-C show the diversion, the first from the Ware, the second from the Swift and the third from both combined, for each day during the year 1923, both under the Massachusetts legislation and under the restrictions of the Secretary of War; that 1923 would be termed a normal or an average year for the Connecticut River; (616) that during the history of the last 14 years, there were only 14 days, or an average of about one day a year, when the natural flow of the Swift River was less than 20 million gallons per day at Bondsville; that the legislation provided that when those days occurred, an average of about once a year, water should be let out of the reservoir so as to increase the flow at Bondsville, up to 20 million gallons per day; that because those days occur so very rarely, the 20 million gallons per day being practically the minimum daily flow of the stream, the Army Engineers' restrictions said that when the flow of the Connecticut River at Sunderland got down to 4900 cubic feet per second, instead of being satisfied with 20 million gallons per day at Bondsville, there will have to be released from storage enough to bring that flow up to 70 cubic feet per second, and when the flow of the Connecticut River gets

down to 4650 cubic feet per second, the release will be 110 cubic feet per second from storage; (617) that during August 1913 the natural flow of the Swift River would have been augmented under the requirements of the Secretary of War practically all the time; (617-618) that this increase in flow would go down the stream into the Connecticut; (619) that there were not many days during July, August, September and October of 1923 and none from about the 24th of August until about the 24th or 25th of October when the natural flow of the Swift River would not have been so augmented, (up to 110 cubic feet per second or up to 70 cubic feet per second depending upon the gauge at Sunderland); (622) that the year 1915 was a dry year on the Connecticut River, but there would not have been so much water let down in 1915 as in 1923, which was an average year; that during an average year there might have been let down considerable water because the flows of the Swift and the Ware were low, while in a dry year, 1915, when water was needed very badly in the Connecticut River, Massachusetts might have been letting down less than the natural flow of those streams; (623) that the average flow of the Connecticut River at Sunderland is 13,900 cubic feet per second, which corresponds with 17,000 cubic feet per second at the Massachusetts-Connecticut state line; that in 1923, the annual flow was 13,500 cubic feet per second, or within 400 cubic feet per second of the mathematical average; that while the average was 13,900, 1915 was 11,500 cubic feet per second and 1914 was 10,800 cubic feet per second; that the flow at Sunderland in 1927 was 15,300 cubic feet per second; that 1916, 1920, 1922, 1925 and 1928 were all slightly wetter years than 1927; (624) that the year 1920 had the highest annual flow of any year since 1914; (627) that Exhibit C-13-A shows the number of days per year when diversion from the Ware River would have been permitted under the restrictions of the Secretary of War; (628) that for the year 1913 water could have been diverted under the restrictions of the Secretary of War from the Ware River on 126 days, or the same number of days in that year as it would have been

possible to divert water under the Massachusetts legislation; that in 1919, the number of days on which diversion was possible was 196, which was the largest number of days in any one year; that in 1915, under the restrictions of the Secretary of War, water could have been diverted from the Ware River on 73 days, and 81 days under the Massachusetts legislation; that on the average, water could have been diverted from the Ware River 138 days per year under the Army restrictions, and 145 days per year under the Massachusetts (629) legislation; that Exhibit D-15-A shows the maximum daily flow for each year on the Swift River, and that the amount of diversion possible from this river under the Army regulations was 100 percent of the stream flow in every case; (629-630) that the reason that there was 100 percent diversion on each of these days was because the flow on eight square miles below the dam and above Bondsville was equal to 20 million gallons a day and because there was so much water going down the Connecticut River that the War Department restrictions did not apply to the Swift River on these days; (634) that Exhibits C-25-A and C-25-B represent estimates of the average effect of the diversion of water from the Ware and Swift Rivers on the Connecticut River at Hartford, that they are based entirely on averages and not upon flows on any specific day; that C-25-B is based upon the Massachusetts legislation and C-25-B upon the restrictions of the Secretary of War; that they show the effect both in cubic feet per second diverted and in feet reduction in stage on the Hartford gauge, and also the percentage of time over the 25 years' record that this effect would have been felt; (635) that, for example, when the stage at Hartford is three feet, equivalent to a flow in the Connecticut River of approximately 8500 cubic feet per second, or 0.806 cubic feet per second per square mile, assuming this rate of run-off prevailed over the entire drainage area, the diversion from the Swift River under the legislation would have been 125 cubic feet per second, and there would have been no diversion from the Ware, so that the total diversion would have been 125 cubic feet per second, which is equivalent to a lowering of the gauge at Hartford of

four one-hundredths of a foot or one-half inch; that this difference on a 3-foot stage at Hartford occurs about 15 percent of the time; (636) that the improvement under the Army Engineers' restrictions occurs at a gauge height of 2.1 or less; that the average addition would amount to one-eighth of an inch on the gauge 80 days in the year and one-quarter of an inch on 33 days; (637) that Exhibit C-25-A shows that if the diversion is carried out under the Massachusetts legislation, the Hartford gauge would on the average be lowered, during that 22 percent of the time when the Hartford gauge stands at 2 feet, by two one-hundredths of a foot, whereas, with the War Department restrictions in effect, the diversion would result in an increased gauge height at Hartford in the amount of one one-hundredth of a foot; (638) that on the average, with 5200 cubic feet per second flowing at Hartford, which would keep the gauge at just the minimum required by the Government project, this Massachusetts plan would have an effect of reducing the depth of the water one-quarter of an inch, and with the Army Engineers' restrictions in effect, it would result in increasing the depth at Hartford by one-eighth of an inch; (640) that when the gauge at Hartford is 12 feet and the flow correspondingly is 45,500 cubic feet per second, the reduction on the average would be 0.27 feet, or three inches; (646) that based on average figures, the lowering of water at Hartford, due to diversion under the restrictions of the Army Engineers would vary from adding two one-hundredths of a foot at the very low stages to reducing it by three inches, when the Hartford gauge is at 11 feet above zero; (656) that the average flow of the Connecticut River at the state line as testified to by Dr. Winsor, namely, 17,000 cubic feet per second, is correct and also, as testified by Dr. Winsor, that the average diversion under the War Department's restrictions is 2.01 per cent; (2224) that to the question:

> "Referring to the testimony of Dr. Winsor, page 1416, concerning distribution of the quantity of water diverted from the Ware-Swift River, with regard to the Hartford gauge, do you understand that whenever the Hartford

gauge gets to two feet or less navigation would be improved by the working of the project contemplated on the Swift River under the restrictions of the Army Engineers, as testified to by Dr. Winsor?" he replied: "No, I don't understand that at all, that that is correct. I have before me a statement showing the number of days when water will be released in excess of the normal or actual, I mean in excess of the actual flow of the Swift River under the Army Engineers restrictions, and this shows the number of days in each month from 1914 to 1927, showing an average of 37½ days a year. The second page of that statement shows the number of days that the Hartford gauge is two feet or less at lower low tide, and shows that that will occur on an average of 67 days a year. Or almost twice the number of days that water will actually be released. There is also attached to that, a statement showing the typical or the maximum diversions on specific days compared to specific gauge heights on the Hartford gauge. And this showed, therefore, that the improvement would be less than 60 percent of the time;"

(2225) [The statement referred to by Mr. Jacobs in his testimony on page 2224 was filed as Exhibit C-41. On page (2233) it was agreed that defendants should later supply an Exhibit similar to C-41 for the years 1913, 1928 and 1929 not included therein to be marked D-36.]

NAVIGATION

FRANK E. WINSOR, Chief Engineer, Metropolitan District Water Supply Commission, (68) testified that separate applications were made on the same date to the War Department for permission to divert the waters of the Ware and Swift Rivers; (69) that no plans other than those defined in the legislation were filed with the War Department; that no plan of the intake dam on the Ware River was filed other than the general plan defined in words by the legislation; (95) that the 131 cubic feet per second mentioned in the War Department communication is equivalent to 85,000,000 gallons per day; (104) that the gauge at Sunderland, Massachusetts, is approximately the same distance from Hartford as the proposed dam on the Swift River is from Hartford, figured as the water flows; (105) that the 31 cubic feet per second mentioned in the War Department communication is equivalent to 20,000,000 gallons per day; that the 70 cubic feet per second mentioned in the War Department communication includes the 31 cubic feet per second provided in the Massachusetts legislation—this 70 cubic feet per second is more than twice as much as Massachusetts requires; (696) that no formal request has been made and no permit or authorization has been issued by the War Department to erect the temporary dam proposed on the Swift River.

NATHAN B. JACOBS, representing Morris Knowles Incorporated, an expert witness for Connecticut (658) testified that periodic reports concerning the development of navigation on the Connecticut River between Holyoke, Massachusetts, and Long Island Sound have been made since 1867; that annual reports as to shipping, showing tonnage and value, have been made by the War Department; (665) that a navigation project for the Connecticut River between Hartford and Long Island Sound was adopted by Congress about 1880, providing for a 10 foot channel; that on February 27, 1911, Congress adopted

a project providing for a channel 300 feet wide by 15 feet deep across the bar at Saybrook, the mouth of the river, and 100 feet wide by 12 feet deep af mean low water between Hartford and Long Island Sound; (666) that the distance between Hartford and Saybrook, at the mouth of the river, is about 52 miles; that the reports of the War Department show that 11 feet has been the controlling depth between Hartford and Long Island Sound, which is one foot less than the authorized project depth; that there have been numerous reports recommending the establishment of a navigation project between Hartford and Holyoke, (667) but no project has as yet been adopted; that the reports of the War Department show that the navigation between these two points is primarily pleasure boats; that in the permit issued by the Federal Power Commission to the Northern Connecticut Power Company for a new dam at Windsor Locks the restrictions of the Chief of Engineers require the construction of adequate locks to accommodate navigation; that there are locks now existing and records are kept of the number of boats that pass through; that these locks are in the power canal between Windsor Locks and Thompsonville; (668) that in 1927 the annual report of the Chief of Engineers showed shipments on the Connecticut River below Hartford of 592,922 tons, comprised principally of coal and petroleum products having a value of $36,029,655; that the coal tonnage was 250,535 tons, the oil and petroleum products 284,766 tons, totalling about 535,000 tons out of a total of 592,000 tons; that these figures include the Saybrook tonnage at the mouth of the river which is a small percentage of the total tonnage; that the Hartford and New York Transportation Company and the Standard Transportation Company carried between 80 and 90 per cent of the total tonnage shipped on the river; (674) that the Hartford and New York Transportation Company ran both freight and passenger service from Hartford to New York; that in 1927 there were 7,681 passengers from New York to Hartford and 17,659 passengers from Hartford to New York; that in 1927 there were 288 trips by steamers on the river, having a draft of between 10 and 12 feet; that there were 4 by motor

vessels having the same draft, and 352 by barges; that there was also equipment on the river for a lower draft; that there were about 17 motor vessel and 170 barge trips by craft, having a draft of between 8 and 10 feet; that there were some trips for very low draft, 22 motor vessels and 1 barge; (675) that the net registered tonnage was 240, 322 for steamers, 3,761 for motor vessels, and 345,861 for barges; (676) that for the years ending June 30 from 1912 to 1926 inclusive the Federal Government spent $326,994 for new construction, and $323,700 for maintenance of the channel; that the records of the Standard Transportation Company show that in 1929 the depth at mean low water over 20 bars located in the channel between Saybrook and Hartford ranged from 9 to 10 feet; (677) that this is the actual depth recorded by the people who navigate the river, made from soundings by skippers on the boats and the barges; (678) that the annual reports of the Secretary of War and the Chief of Engineers always divide the Connecticut River into two parts: 1, the Connecticut River below Hartford, from Saybrook to Hartford; and the other, the Connecticut River above Hartford, from Hartford to Holyoke; that mean low water registers two feet on the Hartford gauge; (681) that the coal rate from New York to Hartford is $2.65 per gross ton by rail; that the rate by vessel is from 95 cents to a dollar; that the coal rate from New Haven to Hartford by barge is 75 cents per gross ton; (682) that the rate by rail is $1.20; that most of the coal is shipped from New York and New Jersey points to Hartford; that the bar depths given are to the nearest half foot, in other words 8 ft. may be 8½ ft. or 7½ ft.; (683) that the report of Major Pillsbury dated June 22, 1915, House Document No. 132, 65th Congress, 1st session, says that above Middletown it has been found impracticable as yet to maintain the channel to full width on account of the extensive shoaling brought about by the annual freshets.

JEREMIAH E. BECKWITH, of Saybrook, Connecticut, pilot and steamboat master (830) employed as a pilot for some-

thing like 40 years, principally in the Connecticut River and on Long Island Sound, testified that he was familiar with the channel of the Connecticut River and the bars located in the River; (831) that the bars are located substantially as shown on complainant's exhibit 28; (833) that he has been employed by the Standard Transportation Company for the past ten years; that he made something like 100 trips last year; that his Company put 204 barges through the Lyme Bridge last year; (834) that the approximate tonnage per barge was about 1500 tons; that they have experienced difficulty in navigating the river a great deal of the time on the low water; that on the low river the channel in places on these bars is any where from 60 feet to 100 feet wide, more of them at 60 than at 100, and there is no place on the bars in an ordinary low river where there is 10 feet of water at low water; that there is about 10 feet of water just over the bars at mean low water; that the bars varied anywhere from 500 feet to one half mile long in the channel; that the channel outside of the bars varies from 12 feet up to 15, but the 15 are very scarce; (835) that the bars in the channel have to be dredged every year in order to navigate the river at all; that the dredging commences sometime in the middle of June or the first of July and continues until sometime in November when they can get money enough to do it; that last year they dredged about two and a half or three months; (836) that last year there wasn't much effect from the dredging on these sand bars in the channel as they just took the lumps off; they just skimmed it off; they didn't have much to do with; just merely took out enough so it was possible to get over; that the natural depth of the Connecticut River if it was left alone would be somewhere around 7 or 8 feet on those bars; that this dredging is all done by the United States Government; (837) that his Company brings up the river oil, gasoline, kerosene oil, fuel oil, and naphtha, all products of the Standard Oil Company; that the load on each barge is about 9,000 barrels, and sometimes, in the freshet, ten or eleven thousand; (838) that they bring up a little more in a freshet ordinarily than they do on a low river; that the capacity of each barge is 15,000 barrels,

which is what she could be loaded to with 12½ foot draft; that because of the depth of the river they confine their load to 9,000 barrels instead of the capacity load of 15,000 barrels; that from his experience on the river he does not see where any amount of water, great or small, could be spared; he thinks we need more; that he has seen times when he has had barges ashore on the different bars; that the last inch which could be obtained on high water was the one that floated the barges; (839) that from his experience on the river an inch of water is important; very often the last inch is what gets them over the bar; that half an inch would do half as much good; (841) that when the gauge at Hartford shows between 3 and 4 feet, the presence or absence of half an inch of water in the river would make a difference in navigating it because the barges are only loaded to a 9 foot draft but could be loaded to another foot or two deeper and so bring up much more; that because of the absence of half an inch of water when the gauge at Hartford registers between 3 and 4 feet a low load must be carried on the barges; that the trip up is always on the tide; generally leaving Saybrook two and a half or three hours before high water in New London; that the trip up the river is made as far as possible on the flood tide and then the trip is resumed on the next tide; (842) that, if the flood tide is coming in the afternoon and the trip clear through to Hartford can be made, it makes twelve hours difference or so with us; that if the barges have to lie overnight at Middletown or Rocky Hill the whole night is lost and the barges have to wait until the next tide the next day; that sometimes, by not being able to get through, the barges on the trip up are caught in a fog, whereas, if the trip up could be made without interruption nearly twenty-four hours could be saved; that such delays are all due to low water in the river; that the best days are generally Tuesday, Wednesday, Thursday and Friday; that Saturday, Sunday and Monday are poor days; that this is on account of the mills at Enfield and along the river shutting down Saturday noon or Saturday night and stopping the water from coming into the river which makes about six inches to a foot difference on Sunday or Monday morning; that they

navigate every day in the week they possibly can, and a good deal of the time at night; (843) that the spread of the tide at Hartford is about 18 inches although the government figures it at 14 inches; (844) that the fall is the time of year when they have the most trouble getting over the bars; heavy westerly winds and northwest winds, Saturdays, Sundays and Mondays a great deal of the time, blow the water out of the river and makes it a good deal lower; (845) that the government usually begins dredging after the freshet recedes, after the water gets down to something below seven feet on the Hartford gauge; that that would be sometimes May and sometimes up to the middle of June; that the Hartford and New York Transportation Company has done the dredging for the government; (847) that after it is dredged it is improved a good deal; that the improvement continues generally until the next spring unless some boat gets ashore and kicks the sand up into a lump or something like that; (848) that the 1927 flood had about the same effect as an ordinary freshet would, although a high freshet like that causes more current and it forces more stuff down the river that accumulates on the bars.

THOMAS REED, Saybrook, Master and Pilot (849) employed by the Hartford and New York Transportation Company for about twenty years; testified that he handles towing craft, towboats; that the Transportation Company also runs a line of passenger boats between Hartford and New York; that the passenger line is now under the name of the New England Steamship Company; that he put 100,000 tons of coal into the Hartford Electric Light Company at South Meadows this last year; that it is brought up in barges; that his company brings coal to the Hartford Coal Co., the Mason Coal Co., and the Hatch and North; (851) that when you have 10 feet of water in the river, a half inch or an inch makes a big difference; that on his draft he has to work the tides to get the barges up; that on a low river the barges are loaded anywhere from 10½ to 11 feet draft; that over an inch of water is needed on some of

the bars to get over; sometimes if he gets ashore it is necessary to wait until the very highest flood tide—nearly the top of high water to get them over; that even a half an inch is a big help and an inch sometimes does the trick; that they leave Saybrook on a rising tide, on the first of the flood tide, and work that tide up as far as maybe Middletown or Rocky Hill; that if the tide begins to fall they have to anchor and wait for another one; that there is a delay sometimes of eight or ten hours, sometimes twelve hours, on a low river; that at freshet times it doesn't matter so much; that it would require seven or eight feet on the Hartford gauge to provide a sufficient volume of water in the channel of the river to go ahead with navigation without delay in putting a fair load on the barges; (852) that that would be with ten and a half or eleven feet in the channel; that the loading of barges is governed altogether by the conditions on the river; that in freshet time, when there is plenty of water in the river, they are loaded to their full capacity anywhere from eleven to twelve feet draft, averaging anywhere from 800 to 1,000 tons; that when the river falls off to ten feet over the bars the barges are lightened making a difference in tonnage of anywhere from 200 to 300 tons per barge; (853) with the Hartford gauge between three and four feet, if any water is taken out, it will have an effect on the draft; that anything loaded a little deeper will have to be lightened up a little; that the cargoes are all loaded by the stage of the water occurring in the river; that the more water there is in the river the deeper the barges will be loaded; that means more draft; that the lower the water the lighter the draft; that the towboat itself draws about nine and a half feet; if the barge is light, and with nothing, it draws about four feet; that the navigation in the river wears on the keel of the vessel; that the bottom of the Connecticut River is nothing but sand, mostly hard sand; especially on hulls it scrapes the sheets and wears them down and wears them to the plates; that he has sometimes seen it wear into the rivet heads or make them leak around the plates; that it wears along the shoe or keel; that they have a false shoe; (854) that the towboats are equipped with shoes for the purpose of stopping the wear on the hull; that

sometimes they have to be renewed; that where most wear occurs is right at the stern where they draw the most water; that the draft on the tugs is lessened to nine and a half feet in the river; that on Long Island Sound and the ocean the draft is anywhere from eleven to twelve feet; that most of the barges are from the coal ports, Amboy, South Amboy, and Jersey coal ports; (855) that the tugs are lightened at Saybrook by the letting out of water ballast; (856) that a reduction of the level of the water in the river of a quarter of an inch would be a little too fine for them to consider letting the water out of the ballast tanks; it would not be worth while figuring that out; (857) that an inch in the lowering of the water affects the navigation on a low river; that all the depth possible is needed but that a variation of an inch would not affect his company with respect to lightening its tug when starting up the river; that usually three to four barges are taken on a single tug when coming up the river, towed one behind the other; that the reports of the condition of the river come from the Hartford office; that a report is obtained at Saybrook of the condition of the river, if there is a rise in the river or the river is very low; that he does not remember getting a report from Hartford of a change of an inch or less in the reading of the gauge; (859) that if one of the barges was loaded to a twelve foot draft it would need about 12½ feet of water over the bar; that 6 inches clearance is the least allowance; (862) that if the water is too high it is necessary to dock, and generally we do not come above Middletown when the water is over the banks; that is, in an eighteen or twenty foot freshet, the tows do not generally come up to Hartford with night coming on; that the low levels of the water are from August to November; that sometimes late in the fall they have very low water conditions; that if any additional water was going to be supplied to the river, when it would be wanted would depend on whether any rain or anything to help the stage of the river occurred; usually it would be required between July and early November; that an inch of extra water at that time would be a big help; (863) that because of the condition of the river, it is not possible to carry the load which

otherwise would be carried; that it is found difficult to navigate the boats when the gauge at Hartford is from two to three or even four feet; shallow spots here and there are found with three or four feet on the board.

CHARLES R. BACON, Middletown, Conn., Master Mariner, (911) testified: That he was employed by the New England Steamship Co., that he carries passengers and freight between Hartford and New York, making three trips a week, going down one day and up the next; that his boat has some seventy odd state rooms and a number of berths, and is 1488 gross tons; that he has been employed in this work about 25 years; that the company has two boats making this trip; (912) that the trips are made daily; that the boat left Hartford every night; that an average of 100 tons of freight is carried each way each trip; that the New England Steamship Company was formerly the Hartford and New York Transportation Company; (913) that the low water in the river as it affects navigation comes along the latter part of the summer; (914) that the Hartford gauge shows ordinarily about 2 feet on an ordinary summer tide; that when the water is shut off over Sunday it is a common occurrence to see it go down close to zero; that he has seen it when it is aggravated by a northerly wind go off the board entirely; that when the Hartford gauge shows 2 feet there is an average of 10 feet on the bars; that a difference of one, two, three to six inches in water would make a big difference in navigation but perhaps a half inch is a little close; that, from the viewpoint of navigation, no water can be spared from the Connecticut River; (915) that the fact that none can be spared in the Connecticut River is founded on his experience as a practical mariner navigating the river practically every day; that, for instance, he went out of Hartford with 300 or 400 passengers aboard, proceeded about a mile or two, when his boat went aground; that was on Labor Day last summer; (916) that a fair schedule for their boats is made; (917) that if, on Labor Day, instead of water being subtracted

from the river, some water had been added, that would have helped; that it is the practice of power companies, manufacturers and mill owners up the river to hold the water back on Sunday; that that was one cause of the difficulty on the day he got stuck, (918) if some water had been added it might possibly have helped; that his boat draws ten feet on an average, but with freight the draft gets down to eleven feet; that, when the draft is that low it is necessary to wait for the tide to help out; that any delay depends on the stage of the tide and how fast the tide comes in; (919) that their trips are continued until about January 1st, although sometimes they run into February; the trips continue as long as possible; that the critical period, so far as the water is concerned, is along in September and October; that, with the gauge at 3 feet, perhaps the lowering of the water one inch would be a little too fine to consider, but two inches would be noticed; (920) that, if there was really a 12 foot channel over the bars, his boat would slide through very comfortably, but that is very seldom; that it does not stay but a very short time; that the banks come in, and as the boats go up and down that sucks up, and if unfortunately a barge goes ashore, in pulling her off the propeller wheels stir the bottom up, and it is no time before these bars are all torn to pieces; that if there is a ten foot channel, that is a good average—that is, ten feet when the gauge is at 2 feet; that if there is 11 feet on the bar a diminution of 2 inches would not make any difference, or at any higher stage; (921) that, as the stage went up, more water could be subtracted without interfering with navigation; that the channels in the bars are not wide enough so that boats can pass each other; that it was formerly understood that tow boats would give way to steamers, now they do not do so; that this is getting to be more trouble now than the low water; that the low water and the narrow channel and the other boats taking their part of it, creates a situation where sometimes two or three inches makes a big difference; (922) that a half an inch of water either added or subtracted is too small a difference to have any effect under these conditions; that very little water helps a lot, quite a good deal on the

trip up with the tide coming in; that it is surprising the small amount of water that will help when it is lifting and easing the current up.

WILLIAM H. HILL, Master Mariner (923) testified: That he was employed by the New England Steamship Company, navigating vessels and handling freight and passenger service between Hartford and New York; that he had experience on the Connecticut River for about four years; that navigation on the Connecticut River is increasing; (924) that the channel depth over the bars is not exceeding 10 feet with the gauge at Hartford reading 2 feet; that his boat draws on an average 10 feet; that loaded with passengers and freight it draws anywhere from 10 to 11 feet; that the period of low water is from September to November usually; that under normal conditions they always find it low every Sunday, weekends, Sunday and Monday night; that this is the period when the Holyoke Dam is closed and they are ponding water up the river; that any water released during that period to benefit navigation would have to be sufficient to fill that pondage; (925) that in his opinion no water can be spared out of the Connecticut River; there are times when there is not sufficient water now; that, with the gauge reading between 3 and 4 feet, in the light of his experience in navigating the River, no water could be safely taken out without injuring navigation; that there are times when on the trip up the tide has to be depended upon to help the vessels having a heavy load when the gauge at Hartford is between 3 and 4 feet; (925) that during the flood period the taking away of water would not work any damage or hardship to navigation; (926) that, from his observation when vessels have heavy loads, there is no more water than is needed when the gauge is between 3 and 4 feet at Hartford; that at sharp bends in periods of medium flood, difficulty is experienced in passing other crafts; (927) that, if any water were added during low stages, it would be welcome; that the most

difficulty is experienced with the bars usually after September to November, and sometimes there is a low period in the spring; there will be a period of a week or ten days sometimes when the bars fill up very quickly; and then if there happens to be a dry spell, much trouble is experienced in the fall until the bars are dredged, but usually before that the floods come; they don't intend to dredge until after the flood period because they cannot operate their dredge, and the strong current brings silt and sand and fills the cut up faster than a normal flow would at low stage; that the flood contributes to the height of the bars; that if there were no floods but a larger uniform flow, the navigation of the river would be easier, if there was enough water; that the dredging noticeably improves conditions; (928) that the amount of tonnage is increasing because there are other companies, although the amount of towing by the Hartford line has decreased.

HERMAN BURGI, Springfield, Massachusetts, Engineer and Master of Steamboats operating on the Connecticut River, (928) testified: That he has an unlimited master and pilot's license on the Connecticut River and Long Island Sound; that he is familiar with the Connecticut River between Holyoke (929) and the Sound; that between Hartford and Holyoke the River is very low in the summer, so that they are unable to go up and down with the boats as they would like; that they can get back and forth between Hartford and Holyoke in the spring and during the fall floods; that he has one boat that draws 5½ feet and one that draws 3 feet; barges are loaded to whatever they think they can carry; that he actually navigates between Springfield and Long Island Sound sometimes; that he is superintendent of the Springfield Navigation Company; that he has a 65 foot boat that draws 5½ feet, which he used to go up and down the river; that he has traveled from Springfield to Florida in it; that to navigate this boat he has to have 44½ feet on the gauge at Springfield; (930) that 2 feet on the

gauge at Hartford is equal to about 42 feet on the Springfield gauge, so that 44½ feet at Springfield would mean a 4½ foot gauge at Hartford; that, during the period when the gauge is at 4½ feet at Hartford, any diversion of water would affect navigation; that between Springfield and Hartford they are affected by small amounts of water diverted on account of 3 distinct sets of pools and 3 sets of rapids; one at Podunk, one at Farmington; one at Bissell's Ferry at Scantic; that those are the bars they have to overcome, and if the flow of the river isn't there the water runs out; that there is 8 feet 6 inches of fall between Hartford and the foot of the locks at Windsor Locks; (931) that he is acquainted with the river between Hartford and Long Island Sound, and agrees with the navigation situation as testified to by the other witnesses; (932) that while his 65 foot boat is a yacht and not a commercial boat, it is used sometimes as a tow boat for business purposes; that he has towed some boats of the Merritt-Chapman Wrecking Company from Hartford to Springfield; that he has taken other people who have done work up that way and had to be towed up; that he has to go thru the Locks at Windsor Locks to get up to Springfield; (933) that he has taken up pile drivers, dredging boats and so forth from Hartford to Springfield; that 3 years ago he took up 3 boats for the Scott Wrecking Company of New London, who were working on the north end bridge; that before that he took 8 or 10 of them up for H. P. Converse and Company, who built the new county bridge; that he agrees with the statement in the Chief of Engineers report for August 3, 1929 that no commerce was reported for last year, the only navigation being one derrick and 46 pleasure boats which passed through the locks of the Northern Conn. Power Co. at Windsor Locks, Conn.; (934) in 1912 the government did some work in removing and rebuilding the breakwater at the Farmington River between Hartford and Springfield; that he is engineer of the Springfield Gas Light Company; that his company sometimes does dredging at Springfield; (935) that from his observation of the river he would say that any addition to the water during the critical periods of low stages would be of benefit

if there is enough of it; that every additional cubic foot per second at low stages of the River would be some help; that, so far as navigation is concerned, if you could have an additional cubic foot per second in the low periods he would be willing to give up some of the flood waters in the high periods; (936) that he wouldn't want to give up any water during the period when you want 44½ feet on the Springfield gauge or 4½ feet on the Hartford gauge; that the River has got to have that to flow between Springfield and Hartford; (937) that it takes 2 more feet for us to get thru the rapids between the Locks and Hartford; that the 2 feet is an addition to mean low water at the Sound or 2 feet on the Hartford gauge; (938) that there is an application now pending with the War Department for a development of navigation between Hartford and Springfield; that they have had hearings on it; that the project is to give a lock 310 feet (939) long, 45 feet wide, with 12 feet depth over the mitre sill, that is where the gates come together; that there is a prospective development at Springfield for further transportation, to lessen the freight rate on coal; that the Springfield Gas Light Company uses roughly 100,000 tons a year; that they think they can lower the freight rate from 70c to a dollar a ton; that the city of Springfield was willing to build the terminal facilities demanded and they would also dredge from the channel to the terminal facilities; and that the other cities had offered the same thing; (940) that he expects the project to go ahead.

ROBERT J. NOBLE, of Brooklyn, New York (944) testified: That he is Vice President and General Manager of the Hartford and New York Transportation Company; that he is familiar with the Connecticut River between Hartford and Long Island Sound; that he has been on the River until this past year since 1882; that he is a sailor, fireman, barge-captain, deck hand on steam boats, general useful man from the office taking charge of dredging and so on, until he was made assistant superintendent; that his company dredged the river from

time to time for the government; that, when the government would not help, the company dredged it at their own expense; that the company dredged it for the government nearly every year; that he had charge of the work for 3 or 4 years; that during the freshet period no trouble in navigating other than the danger of bitting bridges or something of that kind was experienced; that when the low water season comes the steamboat company has quite some difficulty in getting its boats up and down, particularly until (945) the bars are dredged off; that unfortunately, several of the bars are in about the same condition at the same time, and having only one dredge only one bar at a time can be taken care of; that sometimes, not having finished a bar, the government allows the dredge to shift, to take the top off and shift to another bar, then returning and finishing the bars up, a rather expensive proceeding but it has to be done; that he has heard that the river has been dredged to 12 feet in depth but he was never able to find 12 feet of water at low tide; that he has not found exceeding 10½ feet; that last year his Company transported in coal, anthracite and bituminus, 223,550 tons, about 5,000 tons of fertilizer was handled; (946) that up to April 15, 1929, the freight and passenger service from New York to Hartford was handled by the Hartford and New York Transportation Company, but since that time it has been handled by the New England Steamship Company; (947) that the diversion of any water at any time that the Hartford gauge is below 5 feet would affect the Connecticut River; that additions up to 10, 12 or 15 feet would help navigation; (948) that the best and most economical period of navigation on the River is when there is from 6 to 7 feet of water on the gauge; that his Company would be glad to dispense with a great deal of water between March, April and May and would prefer an addition to the water increasingly as the river was lower in its stages (949) that the high water damages the Company steamboat landings; that dredging operations commence when the water is about 6 feet on the Hartford gauge; that the water drops very fast, and before one bar is nearly completed there is some other (950) bar that is bothering, and because some of

the Company Steamers may have gone ashore they ask for the privilege of going on that other bar, taking the crest of the bar off; but the crest can build up during the freshet season; that they were supposed to dredge so that the channel will be 12 feet deep at low water, but that depth is never found a few days after the dredging has been completed that the dredging went as deep as the government would allow; (951) that the government specifies where the material shall be dumped that is taken off the bars; that it is dumped in the river; (952) that in the bids the contractor is not obliged at any time to tow it over two miles; that with the exception of the bars there is plenty of water in the river; that the dumping of the material in the river has been done for a great many years; that with the little amount that is appropriated for the work in the Connecticut River, if it had to be towed over the Saybrook Bar, there wouldn't be money enough to dredge one bar; that the material is dumped in certain places, eddies and big holes that the government selects; that other bars in other places build up, that whether it is of that sand that is dumped in there he doesn't know but in several places that sand must go somewhere during the year because next year the hole is there to fill all over again; that he has noticed, since he has been on the river, the filling up of several new bars; that the bars fill up gradually; that it is probably two or three seasons before a new bar is first noticed; (954) that the channel has been changed due to the sand bars which have been added to, and the floods have brought some stuff down and deposited it on the bars; that the boats have real trouble when the Hartford gauge shows 4 feet, because with 4 feet in a heavy westerly wind there is rather low water at the lower end of the river where reliance is put on the tide to help a great deal; that with 4 feet of water on the Hartford gauge, the barges are rarely loaded to capacity since trouble is feared because with 4 feet of water on the gauge it is difficult to know what the conditions will be the next day or two hours later and because the barges are loaded at the coal ports; that the tendency is (955) for the water to fall, and if there is 4 feet the transportation company does not have so

much trouble from its barges the way it loads them; that if there were four feet on the Hartford gauge and the water was lowered ½ an inch a captain would be frightened a little bit, because he would not know where it was going to go; that no one knows that it is limited to ½ an inch; that nobody knows just what it will do; that when the river gets to lowering it lowers pretty fast in the dry summer time; (957) that the time lost because of delays in navigating the river is all reflected in transportation rates; that if, on any particular days of the year, when the water is low there is a half inch or an inch or two inches taken out of the stream, it affects navigation; that the actual navigation down the river is affected by a very small amount of water either one way or the other; (1004) that in 1929 the New England Steamship Company and the Hartford and New York Transportation Company combined; that the steamers carried 47,641 tons; that they didn't operate from February 4 to April 15; that there were also several days in the month of August when the steamer was disabled by shallow water; it hit a rock; that only one steamer was operating at that time; that the number of passengers handled was 36,671.

POWER

MR NATHAN B. JACOBS, an expert witness for Connecticut representing Morris Knowles, Incorporated, testified (318) than there is but one power site available on the Connecticut river within the State of Connecticut; (319) that at the present time there is a power development at Windsor Locks, with a dam situated at Enfield or Thompsonville; that Thompsonville is about 2 miles below the state line; (320) that the present dam is a low structure across the river, with a long canal, head-race, several miles long, carrying water which is used for power in certain manufacturing plants along the river; that the site for the development of power is about 3 miles below the dam; (321) that at present the power plant is able to maintain about a twenty-four foot head and to develop about 4000 horse power; that the present project is capable of further development in two ways, one by installing more generators or water wheels at the present site of the water power plant now used, and the other is to improve the development, obtain more head by building a dam farther down the river, but to the same height as the present dam; that thereby no more land above the present dam would be flooded than now, but it would develop a reservoir of larger area, the additional area being between the present dam and the proposed dam so as to avoid the long distance that the water is carried through (322) the present canal to the present power plant; that this new dam site would be at King's Island; that a reasonable maximum development of that (323) site would be about fifty thousand horse power; that figuring on the basis of a 50,000 H.P. development, the average loss caused by a diversion of the waters of the Ware and Swift Rivers according to Massachusetts legislation would be about 1,850,000 kilowatt hours per year; that the loss based upon the same facts except that the diversion be made according to the War Department's restrictions, would be about 1,320,000 k.w.h. per year; (324) that 1,850,000 k.w.h. per year is equivalent to 2,500,000 horsepower hours per year and 1,320,000 k.w.h. per year is equivalent to 1,770,000 horse-

power hours; (325) that the installation for a 50,000 horsepower plant will be the same whether there is a diversion or not; that the same physical equipment, same number and size of generators, same number and size of turbines would be installed; that they would be operated so many less hours because the water would not be there to operate them; that the productive results from the plant would be decreased 1% in case of a diversion under the Massachusetts Legislation and ¾ of 1% under the War Department's restrictions; that the total output of the plant is figured at 171,000,000 kilowatt hours per year; that such figure is net, based on the effect of the diversion, because at some times the diversion actually increases the amount of power that may be developed (326) at the plant, and taking the increases and subtracting them from the decreases, it gives the figure stated; that taking into consideration all benefits and losses which might accrue from these diversions, there will be a decrease of about 1% in productive results under the Massachusetts Legislation and ¾ of 1% under the War Department's restrictions; that a Federal Permit for a development at King's Island similar to the one described has been issued; that the project was authorized January 18, 1928, accepted by the licensee on January 25, 1928, and the permit issued on February 1st, 1928 by the Federal Power Commission (328) to the Northern Connecticut Power Company after having satisfied itself that the company had complied with the laws of the State of Connecticut and Commonwealth of Massachusetts and of its ability to carry out the proposed plans.

MR. EZRA B. WHITMAN, an expert witness for Connecticut, testified that (359) the methods employed by Morris Knowles, Incorporated, in figuring the effect of the diversions upon the power site at King's Island were correct and that the computations made are substantially correct; that the loss of power per year, based upon Massachusetts Legislation, would be 1,847,000 kilowatt hours per year (360) and under the

War Department's restrictions, considering what would be added, 1,320,000 kilowatt hours per year; that the same plant would be built whether diversions take place or not but practically the result of the diversion would be a reduction of 1% in the amount of power that could be generated (361) under the Massachusetts Legislation; and ¾ of 1% under the War Department's restrictions; (374) that a reasonable estimate of the value of the lost energy is 6 mills per kilowatt hour; (375) that the value of the current lost under the Massachusetts Legislation would be $10,800 per year; and under the War Department's restrictions, $7,920 per year.

MR. WESTON E. FULLER, an expert witness for Massachusetts testified (2021) that the loss in kilowatt hours testified by Mr. Whitman was substantially correct; that as far as damage to the power he did not agree; (2022) that water power development operated in connection with a public utility during the dry weather season is operated to the best advantage to take care of the peak loads during the day; in other words, there are certain hours during the day, perhaps four hours, when the load is very heavy; now, if there is a pondage provided so that the water can be drawn at a high rate for a short period, then this water power can be drawn upon, so as to relieve the entire system during these four hours; that that means that the steam plant, which is a necessary part of any development of this size to take up the load during the dry weather period, can be made smaller in size to the extent of that relief of the peak load, because that is the time when the maximum demand comes on the (2023) entire system; that therefore the release of water from the Swift River during the dry weather period is worth a good deal to the power company at Thompsonville; that during the dry weather there is probably about 80 cubic feet per second which is let down the river in excess of what would come down under normal conditions; that is, the total let down is 110 cubic feet per second and the dry

weather flow of the river goes, at times as low as 20 cubic feet per second, and he took it at 30 cubic feet per second, which leaves 80 cubic feet per second as the increase in dry weather flow; that if that water is all used during a period of four hours it means that it can be used at the rate of six times that, or 480 cubic feet per second during the time of the peak load; that that is capable of producing something in excess of 1000 horsepower; so that there would be a saving in the steam plant of this company of 1000 horsepower of steam installation (2024) which, taken at a minimum of $80. per horsepower, (it will probably run something more than that)—would be $80,000 which it would save due to the fact that it could save on its steam equipment; that the loss of power is at a time of the year when it is what is called surplus power; that there is no loss during the period of low water flow, and he thought that six mills per kilowatt hour, as Mr. Whitman suggested, is too high, entirely too high a value for that class of power; that that class of power is sold nearer three mills and sometimes at considerably less; so that in his judgment with the War Department's requirement the power at Thompsonville is benefitted rather than damaged due to the construction of these works of the Swift River under these requirements.

MR. WILLIAM F. UHL, an expert witness for Massachusetts testified (1809) that he did not know very much in detail as to the Windsor Locks proposition; that he knew that there is such (1809A) a place and that he had visited it and had examined reports on it that other engineers had made; that supposing it was a 45,000 horsepower development (1810) and it was proposed to divert 2% on the average, of the average flow of the Connecticut River, in such a way that about 80% would be diverted at the period of larger flow of the river and no water would be diverted when the flow of the river was in its lower stages, that he did not think the diversion would materially affect the value of the development.

AGRICULTURE

MR. WILLIAM H. CARRIER, of Glastonbury, Conn., a witness for Connecticut testified (744) that his occupation is that of farming; that he has a farm which starts about a quarter of a mile from the Connecticut River and runs east about three or four miles; that none of his land borders on the river but quite a bunch of it is in what is called the Glastonbury meadows; that he was born in Glastonbury and lives on the farm his father had; (745) that the Glastonbury meadows border on Glastonbury Main street and end at what they call the Naubuck or Glastonbury dock on the north; that these meadows are flooded every year to some extent, some years higher than others; that part of the farm is in these meadows and part is not; that in the meadows the best paying crop is hay; that the effect of these periodic floods is that land which is flooded the most is where the heaviest crops of hay are obtained; that they have never had to use any fertilizer on this hay land; that they depend entirely upon the flood waters for fertilizer; (746) that the land that is flooded the deepest is where they get the heaviest crop of hay; that some freshets don't cover the high land, where there are high knolls, and that the crop is always light, a good deal lighter than the ones that are covered; that in his opinion as a farmer, the second generation on the same farm the floods in the Connecticut River are of benefit to the farmers owning property along the river where they cut hay; (747) that they keep all of their hay for use in their dairy business and feed it all on the place; that they cut all there is; that they always do so; that some of the lowest part is in pasture; that the biggest part of the hay on the meadows in his neighborhood is cut except in a few swales where water is on it; there may be a little bedding left but the best part of the meadow is cut; (748) that all they pretend to raise on their meadow land that is flooded is just grass and pasture; (749) the reason is that they have land for other purposes and depend on the meadows for hay; that they can get the hay without expense and the rest of the land they have to fertilize; (750) that if

you had to raise hay on the upland it would cost money to raise; that you would have to stock it every three or four years, put on plenty of fertilizer; that most of it is not fit for hay anyway; it is lighter land; it is land suited to raise corn; that the 1927 fall freshet made one-third to a half more hay on the meadows; that in the last few years he has made no money on the land upon which hay or other crops are grown; (751) that it did not reach any of his other land; that they have less trouble with a good high freshet than a half way one; that with the higher ones there is not so much clearing up to do; it all floats away; the 1927 freshet was an extremely high one; (752) that on an ordinary flood, a reduction of three inches in height couldn't be figured in dollars and cents; it would mean three inches less; there would be just a little more land not covered or what was covered would be three inches less in depth; that one inch probably would not make much difference one way or the other, but inches make feet; that three or four inches on a freshet like 1927 wouldn't make an awful lot of difference; that on an ordinary spring freshet it all counts, that he does not know how much difference three or four inches would make; that every inch counts, he doesn't care how high the flood; (753) that as to three or four inches on an ordinary flood, it would make that much difference, whatever that difference is; it makes so much more depth of water and the more depth of water the more benefit; that the less depth so much less is obtained of it; (754) that there is in the neighborhood of 600 to 700 acres in the Glastonbury meadows; that is the area normally covered by the floods; that the hay grown on the meadows is a good hay for dairy purposes; that it is timothy, a natural meadow grass that grows on that particular land and has for years; that some of those acres have never known the plow, just natural meadows; that high land around this section does not raise a hay that is profitable to feed to (755) dairy cows because it costs more to raise; that he starts growing tobacco and vegetables beyond the flood line and that where the flood normally covers, only hay is grown; that the raising of hay is what the meadows are adapted to; (757) that during

wartime he plowed up a few acres of meadow and tried to raise corn but it was not a success; that is the only crop he had tried to raise except hay; that the meadow land is in the tax list for something like $150 an acre; (758) that land where he raises tobacco is in for about five or six times as much.

MR. EDWARD A. ISAACSON of Wethersfield, Conn., a witness for Connecticut, testified (758) that he is a farmer and contractor; that the land on which he raises tobacco is in the tax list for about five or six times as much money as the land that is flooded; (759) that he has between six and seven hundred acres in his farm at Wethersfield; that he keeps cattle and horses; that he has no dairy cows at the present time but is preparing to have some, that last year he raised one hundred acres of corn on the flooded land or land that was flooded in the 1927 freshet; that he raises hay on the flooded land; that the yearly freshets are the making of the land; that he wouldn't give a cent for the land or care to own it if the freshet didn't go over it because he couldn't get manure enough to (760) raise crops and get good hay; that he probably does more turning over and seeding on this meadow land, this flooded land than the average farmer does; that he plows it up and seeds it down to herdsgrass; that he plowed up one piece that hadn't been plowed in about twenty years; that it showed considerable herdsgrass after being laid down for twenty years; that the freshet had kept it well manured; that he always had a crop on it; that he feeds timothy hay and alfalfa, clover mixed in; that he has fifty acres of alfalfa down there now; that it looks fine; that he hadn't tried alfalfa until last year but it looks good this spring after the snow and ice are off; that he never has to use any fertilizer whatever and he gets wonderful big crops; that he gets fully three tons of hay per acre to the first cutting and a total of over three hundred tons on a hundred acres; that the second crop of herdsgrass grows, crisscrosses, on account of it being so rich; that it is all tangled up and when cut and brought to market it is

so rich you can't make them believe it isn't a first crop; that the advantage of the flood water to the meadow land caused him to buy a farm on high land adjoining it where he can keep stock and stuff without being very far away, and if the flood water wasn't on it he wouldn't have made those preparations; (761) that the more flood water the better the grass obtained; that it is sandy bottom and naturally drains out quickly and the floods, even high water where it doesn't cover the top, seems to irrigate the lower parts of it and the lower parts are the richest; that he had tomatoes and things down there, and they grow fast; that sometimes the last three inches of a flood will cover twenty-five acres but if it didn't come down, the flood would never touch it at all; that he thinks that the lower you get to the river without getting where you get too soft, the richer the land is and the bigger the corn grows; that he had that experience last year close to the river; (762) that he never thought that evergreen corn that would grow twelve feet on the upper land would grow sixteen feet high down close to the river; that his land is covered now, the part next to the river; that as soon as the river flood raises a foot there are a few acres more flooded and there might be forty acres with another foot; that when it raises fifteen feet it might cover twenty-five acres more; (763) that the 1927 flood covered approximately 400 acres of his land; that it still shows great improvement from what it did before; that the highest part of it seemed to get a great silt improvement on top of it and it still does it good; that the 1927 flood did not leave debris and refuse but carried it away; that some freshets leave some refuse, hay and grass and stuff that rakes have not taken clean, which they generally light a match to and burn up; (763) that the flood of 1927 went so high that everything floated on top of the water and it carried a lot of debris and stuff that was left there from lower freshets that didn't go high enough to carry it all out; (764) that he has one place thickly wooded and some refuse and debris gets in between those trees and lodges and there are places where the silt goes over it and has raised the land a foot a year, making new land; that he has a lot of acreage that has

grown from filling up; that he doesn't have to clean up his land after ordinary freshets; (765) that considerable damage was done by the 1927 freshet all the way from Vermont to Saybrook; that every city had considerable loss; that some buildings, cellars, etc. were filled with flood waters; that farmers along the banks of the river lost poultry and parts of their farms during that flood; that his barn (766) in the city, the cellar was full of flood waters; that it seemed to bother cities most; that he thinks that was a detriment; that at very high stage it would have benefited to take some away; that six inches of that flood would have made no material difference to him; that on a normal spring flood three inches one way or the other makes a big difference sometimes because if the water comes up three inches and a great big field were on one level, those three inches would just cover it with enough of this water that has this sewage and one thing or another in it, that it makes it grow twice as much crop; that it wouldn't be just three inches of land, but that three inches might cover a level of 50 to 100 acres; that with his particular farm land six inches of water in the high floods wouldn't make any difference excepting that the more area it would cover in the average spring freshet the better; (767) that he doesn't know what it is; that it is dirty water; it washes in from the river in all directions and it purifies on its way and it still takes in more that has not been purified; his land is five to six miles below Hartford; doesn't know as it can be the sewage from Hartford but it is something in that freshet that keeps the land very fertile, and it makes land; some of his land is at least five or six feet higher than when he bought it because of the silt left by freshets; that it keeps rising every year, in some places near the sand beach it will fill in four and five feet in one year; that where the river used to be, he is now plowing and raising corn; that it used to be a very low spot in there when he bought it and it has grown and raised up and now is one of the highest spots he has; (768) that he heard that celery was covered by polluted water and that that was the reason why they didn't know whether they would let it be sold or not; (769) that the flood

this spring, not a very high one, covered about 300 to 350 acres; that a July flood of 24 or 25 feet when he was a boy ruined the crops, ruined them to a certain extent, got the hay more or less dusty, etc. (772) that his land runs from 24 or 25 feet above low water mark to the waters edge; (773) that some hay in his barn was wet by the 1927 flood; that he used the part not wet.

MR. STANCLIFF HALE, of Glastonbury, a witness for Connecticut testified (774) that he is a farmer occupying a farm in Glastonbury which has been in his family since 1701; that part of the farm lies along Glastonbury meadows; that he has twenty-two acres of good hay land and forty-six acres of pasture land and a considerable amount of meadow land; that he considers flood water as it comes down in natural state of value to his property; that in years when freshets didn't cover all land, he had applied a little fertilizer to some of his higher areas particularly to bring out and help the second crop, but where floods cover he has never fertilized; that if part of flood water was taken, decreasing the area flooded it would be advisable to fertilize lightly; that one (775) might get the full benefit of one's land and crop; that he gets his entire hay crop from the meadow; that he has a better crop of hay than some of his neighbors who are dependent entirely on fertilizer on the upland; that he gets hay from the meadows that is good to feed dairy cows, neat cattle and horses; that his land goes down to the river at a very gradual slope and on the lower end of this piece, it was originally an island, that has been filled up; that there was a growth of willow on the south side, on the river (776) side, and every year that is filling up with silt and the willows catching more or less of flood debris and it is filling, in times of normal freshet at the rate of possibly four inches a year; that normal freshet he considers from 18 to 20 feet there; (777) that on 22 acres of hay land normally covered, three quarters of it has excellent hay; that this year he cut this

but allowed a neighbor to have the balance which was not so good; that the market for hay is considerably less than it was 25 years ago; that one end of this piece slopes very gradually from the river; that there is a line (778) of an old river bank and from there on is what is called "made land"; that they use six acres of flooded land for pasture and are seriously contemplating changing the type of farming to where that can be used and that, he would say, is a dominating factor in several of the men's minds who own considerable acreage, how they can adjust and start in some other crops there; that there is a piece of alfalfa, some corn and some potatoes that are grown on this meadow land; that he has only grown hay on his land; that the year following the 1927 flood, he had more than an average crop of hay; that he thinks it helped the hay; that there is not much difference in his town under present conditions of agriculture from the standpoint of profit in raising hay in Connecticut or raising vegetables or tobacco; that in either case farmers lose money; (779) that on one part of his land the flood cast considerable debris and refuse; that this was on pasture land; that he hauled nearly forty loads of wood off; that they were light loads, probably half to three quarters of a cord and consisted of railroad ties, bridge timbers and everything else; that they kept them warm all winter; that he knows of innumerable buildings being flooded; that there are land developments, land sold in the meadows which are flooded about every year; (780) that this is a detriment to such places and probably a danger to health; that those were unhealthy places to live in flood times unquestionably, and that they would be more healthy if the flood didn't come; that people will continue renting and think cheap rent overcomes danger of whatever they may get; that as a residential district the premises as a whole would be better if not flooded but not so as to agricultural district; that he considers it a reflection on a person's intelligence to build and live in such a place; (781) that he was speaking of developments on both sides of the causeway in East Hartford; that the highest point of his meadow land requires a freshet that is registered at Hartford of 20 feet to cover it; that as to how

much effect three inches would have or how much would be uncovered if flood was 19 feet 9 inches freshet instead of 20 feet freshet he couldn't go (782) into details of inches but the higher that land is covered over and the longer there is a flow of silt over it, the more it will settle and improve that land; that he considers that a 20 ft. flood will cover every foot of meadow land in Glastonbury; that if 20 foot is the exact measurement a reduction of three inches would cut down his best quality hay land six to seven acres or from a third to a quarter of the total; (784) that from 17 to 23 feet is the ordinary freshet; that the flood water improves tobacco land the same as it would any other land; that the silt has a fertilizing value, how much he doesn't know but the addition of humus which comes from erosion of other land up the river has always a value to it; (785) that the silt deposited by the normal freshet is of assistance to such tobacco land as it covers; that he doesn't raise tobacco; that he doesn't want to see another flood like that of 1927.

MR. LEWIS W. HOWE of Glastonbury, a witness for Connecticut, testified (786) that at present he is president of the Glastonbury bank; that he has lived in Glastonbury for fifty-nine years; that he owns a farm; that he owns land that is periodically flooded by the Connecticut River on the Glastonbury race land and the log landing meadow; that he raises hay on this land; that twenty years ago he raised tobacco in the log landing meadow; that during the war he had 10 or 12 acres of corn down there; that he is sure that these periodical inundations are a great benefit to this land; (787) that he has never had to fertilize the land for hay but did when raising tobacco; that every year he gets a better crop of hay when there is a spring freshet; but most always there is a good crop of hay in the Glastonbury meadows; that in the event that this flood water was taking away more or less, the part of the land that was inundated or covered with the flood would suffer because of

that taking away; as the river would cover it if permitted to flow in natural course; (788) that in 40 years there hasn't been much difference in one year from another as to floods except in 1927; that he thinks that from 25 to 28 feet is the normal flood freshet; that he has over 25 acres of hay land that he cuts hay on that is inundated with a 21 or 22 foot flood; (789) that three years ago he stopped cutting hay and has sold it standing ever since; before that he cut and used considerable of it for horses; that it has all been cut except there may have been a little of the low land, two or three acres last summer that wasn't cut; that there hasn't been as much demand for hay in his section in the last three or four years but they are commencing to keep cows now and there is some demand; the demand for hay is really poor but is getting better in his section now; last year he got about $10. per acre for the standing grass which is about half what he got two or three years before; that the land would probably average better than two tons to the acre; (790) that the 1927 flood left no refuse and debris on his land; that he has no meadow land; that a 20 foot flood will not take the debris right off; that only a subnormal flood will leave debris on his land; that he hasn't raised tobacco for nearly ten years; that the silt helps any crop that is grown on the land,—corn, potatoes, grass or tobacco.

MR. ALFRED W. HANMER, of Wethersfield, a witness for Connecticut, testified (792) that he is a grocer and first selectman of Wethersfield; that the town owns some land along the river that is periodically covered by freshets; that the town grows hay on this land; that there are about 20 acres flooded, about 10 acres they cut grass on and about 10 acres is used for pasturage; that that part upon which hay is grown has not been fertilized since he can remember; that is about 50 years; that every inch of the hay is cut; that it is a good quality of stock hay; that the town always cut it and fed it out to horses kept for street work until the last two years; (793) that they

sold it standing last year for $15. per acre; that is was a good crop of grass; that the keeping of dairy cows is increasing throughout this section of Connecticut; that milk is being graded and under strict supervision of the State Health Department; that milk sold in Connecticut must come from an inspected herd; that farmers have gone into raising and keeping milch cows and selling under these regulations; (794) that this land has never been fertilized; that about 900 to a 1000 acres of land in Wethersfield are flooded by the normal spring flood; (795) that he knew of several acres of celery condemned after the 1927 flood but that only happened once in seventy-five years; that they sold their hay standing the past two years because the state tested their herd of cows and took them all away and didn't think it advisable to invest in more cows; that they didn't want to spend the time and money and didn't have the force to cut it; that they would probably have realized more per acre for the grass had they cut it and put it into the barn but they had so much highway work they couldn't do it, that they couldn't afford to do it.

MR. RAYMOND A. HARDIN, of Glastonbury, a witness for Connecticut, testified (796) that he is town clerk of Glastonbury and has been an assessor of the town for 21 years; that he has lived in the town forty-eight years, that he owns about 38 acres of meadow land; that it has been in the family a great many years; that there are about 900 to 1000 acres of meadow land flooded in the town of Glastonbury; (797) that this total consists of three meadows, Keaney Point meadow in the north section, the meadow from the Glastonbury dock down to what they call Red Hill, and the south Glastonbury or Nagog meadow; that he sold all the hay on his meadow standing because he has two or three farms and he has sold hay and raised tobacco; (798) that they do not raise very much tobacco in the Glastonbury meadows except there are 50 or 75 acres in the Nagog meadows; (799) that he has never found

it necessary to fertilize any of his land that lies in such proximity to the river that it gets the benefit of these periodical floods or freshets; that if the flood water was taken away they wouldn't get any hay; (800) that he had not tried anything but hay on his meadow land; that he has noticed that if there is a high freshet, when the water comes up 25 to 27 feet they have better hay than they do when it is 25 or 20 feet; that the higher the freshet the better hay they get as a general thing; that in 1928 they had a good crop; that a rainy season gives a better crop than a dry season; (801) that last year for some hay he got $12.00 and some $10.00 per acre standing; (802) that during the war years he got a good crop of hay, and that it was about the average crop; (803) that good meadow is assessed for $125.00 per acre; bedding is in for $20.00 to $25.00; that tobacco lands in Glastonbury are assessed from $200.00 to $500.00; that he cut a second crop of hay on his land; that it is generally true that a second crop is cut on their land; (804) when sold standing some sell the first crop and cut the second themselves but he sells both crops.

MR. WILLIAM R. DUNHAM, of East Hartford, a witness for Connecticut, testified (810) that he has lived in East Hartford about 45 years; that he owns in the neighborhood of 35 acres on the bank of the Connecticut River which is periodically covered by freshets or floods; that it is assessed on an average of $125.00 per acre; (811) that he cuts the hay from this land; that he has never found it necessary to fertilize the land; that when he gets suitable floods he cuts a good crop of hay and without floods he does not get much; that he gets from two to three tons per acre; that he gets two crops; that the second crop is good hay for stock or milking cows; (812) that without flood water the land would be worth very little; that it would hurt that portion of his land which would not receive the benefit of the flood water if any part of it were taken away; that up to two or three years ago he use to sell

hay standing; that he received from $15.00 to $20.00 an acre for it; that the last two years he got two tons on the first crop and from one ton to 1000 lbs. the second crop; (813) that was the usual yield; that he has noticed a variation in some years; that the crop has had a difference of from 1000 lbs. to a ton some years; thinks that the crop last year 1929 was short but good quality; that the year before 1928 it was extra good; that was the year following the big freshet and they had considerable rain; (815) that they generally got a good crop from the land; that he grows a finer quality of hay than timothy; that it is a wild hay but a good hay; that it is a good deal like red-top and some of it grows white clover on the bottom; last year there was a lot of it with white clover on the bottom; that they have been over it for purposes of cultivation, but nothing excessive; that they stick it down a little and it will grow an immense crop of timothy for two or three years; that he has tried a little corn on it two or three times; (822) that during the war, he raised only hay on the flooded land.

MR. GEORGE A. HOLLISTER, of East Hartford, a witness for Connecticut, testified (805) that he is a councilman of the town of East Hartford; that he has lived there all his life; that he owns about 40 acres in the meadows on the Connecticut rim which is periodically flooded; that he gets from two to three tons of hay per acre from his meadows that have never been fertilized for a hay crop; (806) that he doesn't cut the hay, he sells the standing grass; that if the land did not receive the flood water periodically, it wouldn't cut very heavy hay; that the land always cuts two crops; (807) that the crop varies from year to year and depends somewhat on the flood conditions, and of course in a wet season the hay will grow better than it will in a dry season; that he didn't get as big a price for hay the last two or three years but that prior to those last two or three years, he got about the same price every year; (809) that there are breakwaters

along the edge of the meadow to keep the river from cutting the bank, prevent erosion; they are not high enough to keep water from meadows.

CHARLES E. GOODRICH, Glastonbury, Conn., a witness for Connecticut, testified (816) that he is county commissioner of the county of Hartford and lives in Glastonbury; that he owns land along the Connecticut River that is periodically flooded; that he owns approximately 30 acres; that he grows hay on this land; that the land has been in the family since 1700 and something; (817) that he had never known this meadow land to be fertilized; that he considers that the flood waters furnish the fertilization for the crops; that he gets a good crop of hay if he has high water; that he owns the highest knoll in the Glastonbury meadow; on that knoll you can always see the line of the flood water; that it takes a very high flood to cover the top of the knoll; and when one goes down to cut that hay one can often see the distinct water line on that knoll, the line where the freshet stops; that the difference in the height of the flood is indicated in the kind of crop that one gets there; that on the top of this knoll the land is just as good as the rest of it but the hay crop is light unless the water covers the knoll; that it takes a rise of 22 to 23 feet to cover it; that the taking away of the whole or any part of the flood water would work a damage to the land; that the damage in the illustration given as to the knoll, would be measured by the amount of flood that was taken; (818) that the higher the flood the more water there is over the land and the more fertilizer seems to get onto it; that if you have a good high flood you will get a fair hay crop even though it is a dry summer; if you don't get much of a flood in the spring you can have a lot of rain and you may get a fair hay crop; that the rain makes some difference but the flood makes a decided difference whether you get a good crop or whether you don't; that there is approximately 20 acres of his land which he considers good hay land; that the

rest of it is swale and goes to grass; there is only about an acre on top of the knoll; that he rarely ever gets flood water on the top of that knoll; that it take a very high freshet; that the grass is always very light on that knoll whereas the rest has good hay on it; (819) that the top of the knoll is noticeably higher than the rest of it; that it might be 8 feet; that they cut about 6 or 7 acres of hay themselves and the rest is sold standing; that up to 1925 he cut practically all of it; that he stopped cutting because he is not doing much farming now; that up until 1922 he used to keep a lot of horses, did quite a trucking business, and used to use all the hay himself for feed; that since 1925 he has only cut a small portion of it; (820) that for 2 or 3 years he used to cut the hay, put it in the barn and sell it out of the barn; that they always get 2 crops of hay; that the second crop, the rowen crop, grows heavy; sometimes it is not as heavy; that it is a good rowen crop; that he always had plenty of hay for his horses from his meadows; that there was a pretty even supply on the whole from the meadow; during the war he had a bunch of teams that were working for some of the factories and that sort of thing; (821) that they were feeding the hay; that they had hay enough; that since 1925, when he has sold most of the hay, the price has varied; he has sold it anywhere from $22.00 to $10.00 an acre; that last year he got about $12.00 an acre; that he thinks it averaged a little better in 1928; an average he would say of $12.00 to $13.00 an acre is the price for 1927, 1928 and 1929; that since 1925, the average price has been $12.00 or $13.00 per acre; that prior to 1925 the price averaged between $10.00 and $22.00 per acre.

WILLIAM W. ADAMS, Wethersfield, Conn., a witness for Connecticut testified (823) that he is a resident of Wethersfield and has lived there all his life, since 1870; (824) that he owns land along the Connecticut River and that practically all of it is covered by the freshets or floods; that he owns about 25 acres above what is called the causeway; that it

would take an 18 to 24 or 25 foot flood to cover it all; that it slopes toward the west from the River; that he has 25 acres more; some of it will be covered by the water where it backs up from Rocky Hill before it will come over the bank; that he gets no water in the Wethersfield Meadow; where it is pushed up there it will take a 16 foot rise to come over the meadow; that he considers the flood water a benefit to his land; that he has never been required to fertilize his land for a hay crop; that he cuts a good hay crop on the land; that he cuts it himself; that he sells some but feeds it mostly; that he cuts 2½ tons to the acre; that some will cut more than that; that it is good hay and he feeds it to his own stock; that if a part of the flood water was taken away it would damage his land to a certain extent; (825) that to get anywhere near the crop you get today would need fertilizer if the flood waters were taken away; that he keeps 25 head of stock; that he sold meadow hay last year for $26 a ton; that he put it in (826) the barn and held it; that most of the buyers are not buying hay until they get to the bottom of their own mow, but he has half a dozen calls now; that the crops on the land do not always run evenly; that you can tell the difference; that some years you will have better; that there isn't any question that the higher the water you get the better the crop; that he has never had to buy any hay; that if you don't get water over the banks you don't get the silt; that where it backs up you don't get the silt; (827) that the floods run from 18 to 23 or 24 feet in height; that if you go much above 25 feet you think you are getting a pretty good freshet; that from 17 to 24 feet you can get a pretty good crop and the meadows are pretty well covered; that that is pretty generally true in Wethersfield; that he has had some of the meadow land ploughed for corn and has had potatoes on some of it; that he had the corn on it in 1918; (828) that he got a good crop in that year; that it was yellow Indian corn; that he put 6½ acres into corn; that the corn was on the higher part of the meadow land; (829) that he fertilized it a little; that they always do, no matter where it is, to get it started quick; that the meadow land is apt to be a trifle cold; that if anything gets started

on the meadow land there is no place in the world where stuff will grow like on that meadow land after it gets root.

ANDREW CHRISTIANSEN, of Windsor, Connecticut, a witness for Massachusetts testified (867) that he lives in Windsor; that most of the Hartford farmers live in Windsor; that he is a market gardner; that Windsor is on the west side of the river about 3 miles above Hartford; that because of the flood in November 1927 he lost quite a little stuff, celery and carrots; that he had 600 bushels of carrots down in the meadow and the water got all that—3 or 4 feet; when the water went off the carrots were ruined; that he had a half an acre or an acre of celery and that was ruined; all of the rest he had out and up in cold storage so he didn't lose much; (868) that he has 3 greenhouses in connection with his business; that they are about 1000 feet from the bank of the river; that between the greenhouses and the river it is partly level but close up to the greenhouses it is low; when the flood comes up he will have about 10 feet in the hollow before it gets high enough to go over and run into the greenhouses; that in the flood of 1927 the water went up into the barn; that he had about 4 feet of water in the cellar of the barn; that it went into one of the greenhouses somewhat; that the reason he lost the celery and carrots was because the water stood over them too long before it went off, and when the water receded they had spoiled; that he figures his damage probably $2000, because he lost quite a lot of fertilizer, nitrate of soda, because he didn't get it up (869) high enough; he was used to the flood though he never used to get a flood like that, so he didn't get it high enough or he wouldn't have lost anything if he had known it; (871) that if water flows over his land, not as much as in 1927, but if some flood water flows over his celery land and his carrot land it does it good, because it leaves a lot of sediment or grease over the land and fertilizes it; that there was an awful lot of sediment left, and naturally he didn't have to put any fertilizer on it at all and

had a better crop; that when you have water going over your celery and carrots as in 1927 it ruins them, but they never expect to get a flood water in 100 years at that time of the year; (872) that it was a most extraordinary flood; that water going over celery and carrots to some extent would not hurt it, if it doesn't stand on it; that being so late in the fall in 1927, the flood water getting over it and the water settling down on top of it, spoiled it; that the present market for hay in his town is anywhere from $10 to $15 an acre; that there isn't very much demand for it; that he cuts all that he has; that he uses it for his own use; that there isn't quite as much of a demand for hay as there was a few years ago; that he thinks the floods help his hay land.

HAROLD M. NEWBERRY of South Windsor, Connecticut, a witness for Connecticut testified (873) that he has lived in South Windsor for 43 years; that he was born there; that he owns real estate touching the Connecticut River; that the Connecticut River is the west boundary of his property; that his family have owned the land for a great number of years; that there are approximately 15 acres of land on the river; that he grew hay on it to 1914; (874) that since 1914 he has grown hay on 3 acres and tobacco on 12 acres; that he doesn't fertilize the hay land but does fertilize the tobacco land; that the land on which he grows tobacco is subject to periodic inundation, possibly on an average of once in five years; that so far as tobacco is concerned he does not find that the freshets or floods in any way interfere with the fertility of the soil; that he has been able to get good crops on it; that he grows broadleaf tobacco; that he marketed part of his last crop to advantage; that it has been the best return of any land that he has per acre; that he grows tobacco on other parts of his farm on land which is not subject to yearly freshets; that he uses the same quantity of fertilizer on both lands; that any flood of approximately 20 to 24 feet will go over the land; that includes the land on which he grows tobacco; that since

1914 or 1915 the land has increased in height so that it doesn't flood as quickly as it used to; that it is gathering in height from the deposits of the floods; (876) that he thinks our floods are of shorter duration; that the flood is up and away quicker that it used to be but otherwise he doesn't see any difference; that the part of his land on which hay is grown is the first part flooded.

(888) It was agreed between counsel that in lieu of calling other witnesses concerning the effect of flood waters upon agricultural lands in the Connecticut Valley a stipulation should be entered into and made a part of the record; that the stipulation as follows was agreed to to avoid calling any more of the farmer witnesses:

STIPULATION

The plaintiff in the above entitled cause having offered several witnesses, who, being sworn, testified substantially that they owned acreage in the Connecticut Valley, so-called, which acreage was periodically inundated and covered with the flood water or freshets that in the natural course of events flow down the Connecticut Valley, and

The attorneys for the plaintiff having stated in open court that they offered witnesses to prove the acreage that was particularly covered by the freshets or floods in the Connecticut Valley and that all of said acreage was held and used as meadow land for the growing of hay to be used in feeding dairy stock, and that said hay was of an excellent quality and that they cut two crops of good hay each year,

IT IS HEREBY AGREED AND STIPULATED between the attorneys representing the State of Connecticut and the attorneys representing the Commonwealth of Massachusetts that the approximate acreage subjected to such freshets or floods or periodical inundations, is about ninety-five hun-

dred (9,500) acres, and that said acreage grows about two to three tons of hay per annum, which, when cured, is fed to cows and horses owned by the farmers or, in the spring following the harvest, can be marketed at approximately twenty-six dollars ($26.00) per ton, and that said hay while standing can be sold standing at a price ranging from approximately fifteen dollars ($15.00) an acre, to ten dollars ($10.00) an acre.

AND IT IS AGREED that the average price per acre would be twelve dollars and fifty cents ($12.50).

AND IT IS FURTHER AGREED AND STIPULATED that the witnesses summonsed, if called upon, will testify to substantially the above facts,

IT IS FURTHER STIPULATED AND AGREED that the annual inundations or freshets are of such character that the hay above referred to and described can be grown without fertilizer and that the flood waters are a benefit to this extent—that without the flood waters they could not grow as large crops of hay without fertilization, that diminution in the amount of flood water would be a detriment to such of the land as would not, because of such diminution, receive any of the flood waters and that the average flood varied from about seventeen to twenty-five feet above the low level of the river. Practically no crops other than hay are grown on any of the land which is regularly and periodically inundated or flooded.

DR. MONT FRANCIS MORGAN, an expert witness for Connecticut, testified (891) that he was a soil expert at the Connecticut Agricultural Experiment Station; that he had made a survey to determine the acreage in the Connecticut Valley which receives the benefits of flood waters or periodic inundations; that he had made a careful survey of the entire area which is in any way affected by (892) the floods, both soils and crops; that as a result of that survey and study, the total area

which is periodically inundated at some time or another is 13,000 acres; that these 13,000 acres include some other area besides the 9500 acres of hay land mentioned in the stipulation; that the 9500 acres are devoted exclusively to hay crops; that there are other crops; that his figures show about 750 acres of tobacco, about 480 acres of corn, about 250 acres of vegetable crops, 142 acres pasture, and 28 acres of potatoes; that those crops are not shown in the stipulation; that from his study and information on the subject and knowledge of the situation, he agrees with the farmers that they do not require fertilization on the meadow lands on which they cut hay; these meadow lands have received the benefit of flood waters which come down; (893) that there are usually certain lower lying areas, as a rule lying at the foot of the higher lands, which are never flooded; and these lower lying areas are inclined to be somewhat swampy; that then there is generally a slope, as a rule, rising toward the river, although this is not always the case; that it is not the case in some of the meadows in Rocky Hill and Wethersfield; (894) that as a rule the high point of the meadow land is at the river bed, but it is not always the same; that there are generally swells or occasional low depressions at various points over the surface of the meadow; that when the flood water rises it doesn't follow it with a uniform blanket all over the meadows, but there will be re-entrances and pockets where the flood waters reach and in some other places where they do not reach; that the conditions are such that these floods do not cover the entire flood plane—what we call the normal flood is a rather difficult thing to say; but consider what happens on the average year, such as last year was, the entire plane was not covered with water from bank to bank, when one considers the higher areas as the banks; that it comes up for a certain distance over that plane, leaving other portions untouched and the actual area flooded is for that reason varying from year to year; that only the higher floods, which occur every four or five or six years, cover the entire flooded area; that three inches diminution in the stage of the river would make a difference in the area touched or in the area

covered, particularly during periods of normal flood, because the flooded portion of the flood plane lies (895) over the area which is most affected by the average flood; that the higher floods rise up on steeper and more abrupt land, so a reduction in stage in those extremely high floods would make a relatively insignificant difference there on the extremely high flood, because by that time you are rising up to land where there is more slope; but on the average year, three or four inches would undoubtedly make a noticeable difference; that, as a matter of fact, it would leave spots here and there through the meadow land that are not touched at all by the floods, which would come within an inch or two of covering it; that there would be a reduction in the volume of water coming down the river by taking an inch to six inches from the flood water; that, with the improvement which is brought about by the sediments; there would be some difference in the acreage where they received a benefit on account of sediments and in other places none at all; (896) and that would tend to make a less uniform condition than usual; that it would be hard to say absolutely as to any given difference in flood change; that the fact that the plane is not of uniform slope or uniformly level, would tend towards a patchy or pockety condition; that any difference in stage of the flood of the area flooded would reduce the amount of sediment carried onto the land by the water; that if an inch were taken away from the flood, it might be necessary for the farmers to fertilize at the points where there would be no water in order to make a uniform hay crop, but that he doubts very much if the farmers would do it from a practical standpoint; that he doubts personally that the individual farmer would notice the effect of an inch taken from the flood water, but in the aggregate over the entire plane he knows that it would be a material factor; (897) that the testimony of the farmers that the floods normally varied from seventeen to twenty-five feet would be particularly applicable to the main flood plane, which lies south of (898) Windsor Locks; that in surveying and measuring, as testified to, he included the flood areas totaling 13,000 acres (including marsh

land not cultivated) in the state of Connecticut from the state line to Middletown which would be inundated by the Connecticut River; that he did not include a material acreage south of Middletown which is so much affected by tidal conditions that it was not included; that a twenty-five foot flood would be three hundred inches above zero at the Hartford gauge; that three inches off would be one per cent. of that level, but it would not be one per cent. of the level of the flatter portions of the flood plane: (899) that on a smaller flood of seventeen feet a diminution of three inches would reduce the flood stage one and one-half per cent substantially; that commonly bottom lands are higher closer to the river, and fall off as you approach the higher lands because when the flood rises to a higher level the heavier, sandier sediments are dropped out first as they come back from the center of the channel where the swifter (900) current is, and as it recedes backward toward the high land there is less current, less rampy current and finer sediments to settle out; that the proportion of the heavier sediments is always greater as far as the bulk is concerned than the proportion of the very fine sediment; that the river is continually filling up the land nearby on each side, and there may be some cutting at times; that the Connecticut River in Connecticut is, to a certain extent, deltoid deposit because where it reaches Hartford it begins to strike the tide, so consequently the current slows down very rapidly; and for that reason, during flood stages, it dumps its load, and eventually will fill up a great deal more than it is; that, from casual observations, he found instances where some stones and boundary markers were entirely buried and others had to be put on top of them, one in particular across the river from Hayden's Ferry, where a stone monument had been practically buried six feet; that a granite monument had been buried over one hundred to one hundred fifty years since it was put there, so that now it was only a foot and a half above the surface; that was relatively near the river; that the filling up is greater nearer the river; that we cannot say the sediment is uniform all over; (902) that there is quite a material soil varia-

tion in the meadows, some soils are heavier and some are sandier; that the crops varied somewhat with the amount of rainfall, the character of the season, and the amount of sediment that they received; that they get a good crop every year with land which is regularly inundated; that the higher lying areas yield a lighter yield; that those higher areas are frequently more sandy; that he cannot say absolutely that that is the only factor; that the seepage of water from the uplands of the river has an effect; (903) that the seepage from the uplands comes to the greatest extent in early spring when the frost comes out of the ground; that this is prior to the period of flood here in Connecticut; that in reality that is what causes the flood; that it doesn't get down here and get over the bottoms for a couple of weeks or a month after the frost has gone out of the ground here in Connecticut; that the first crop of hay varies somewhat from the latter part of June to the first of July; that they come onto the second crop in the fall; that the second crop is dependent, as far as moisture is concerned, upon rainfall during the summer, but not as to fertility; (904) that if one had a dry summer he would get a smaller second crop; that was the case in 1929 when there was a very dry summer; that he thinks the farmers testified the day before that the second crop was rather light in 1929; that the upland yield is perceptibly lighter than it is on the meadows; that the yield of hay, as testified to by the farmers, is higher than he would have put it on the average, but they knew more about it than he does; (905) that it is materially heavier than the census figures given for Hartford County, which is about one and one-half tons per acre; that the census figures include upland and meadow; that he agrees with the other witnesses that the inundation of the meadow lands improves the crop of grass; that they have made a very careful study and that with experiments and data he has reason to believe that it is so; that it is due to the fact that the sediment contains more available fertility than would be the content in the soil that is left there after it has been growing crops for a period of years; that they have made analyses of five or ten samples of fresh flood sediments collected soon after

the spring floods, and compared those analyses with twenty-five soils from the flood plane that (906) have been there for several years, and had been built up there, and also compared these with twenty-five upland soils that never received any sediment; that he found that the fresh sediment was noticeably higher in organic matter, humus and nitrogen, than the older soil which they built up; that they found very little difference in the phosphorus content; that the sediment is deficient in phosphorus the same as the soil which it forms; that they found that the potash content of the sediment is somewhat higher than the soil which is forming it; that the main increase is in the nitrogen; that there would be some increase in potash; that another factor is that the acidity of the soil is not quite so great; that the material that is brought in is not so sour or so acid as the soil upon which it is deposited; that he attributes the nitrogen to sewage to a very slight extent, but the amount is not great enough to attribute much of it to sewage; that it contains only about four or five per cent. (907) organic matter, and consequently must come from the erosion from the fields and the farms and other lands all over the Connecticut River basin; that as compared to before the war there has been a marked increase in dairy production in Connecticut; that taking the state as a whole he believes that the farmers are going to grow their own hay more rather than go out in (908) the market and buy it; that they are growing better hay on their farms as a result of improved practices, and consequently there is perhaps a little less general demand for hay than there has been before; that the prices for hay have been a little bit lower for the past year or so, but he does not believe that that means anything in particular, perhaps due to the general decline in agricultural prices; that he hardly believes that the decline in prices is a measure of local demand; that hay is brought into Connecticut from western states; that the hay grown on those meadows is a very good quality of grass hay; that it is not comparable to alfalfa hay in protein content as a dairy food, but it is a good quality hay; that the farmers testified to that yesterday and scientific results as far as

analyses of those particular kinds of hay grown in those particular conditions bear it out; that it is equally as good as timothy; that there has been less change in improved methods noticed on these meadows regarding the raising of hay than in almost anything else that is grown in Connecticut, which is probably due to the fact that they can go ahead and get good crops without putting up any money in the way of expenses, so they haven't felt (909) a demand for them; that he would not be able to give an idea of how deep a layer of silt three inches of flood water would deposit; that it would depend very largely on the way the currents were coming; that it might, on some areas of the flooded plane, if that three inches just happened to be just enough to go over some little rise in the land, give a sufficient amount of inflowing water to wash back the sediment and further disburse it widely which would make much more of a difference than if it were absolutely static water in which you would only get the amount of sediment that would drop from that amount of water and you would get no replacement of water; that if it was a flood twenty-five feet in depth the greater portion of the silt would be carried in the upper layer. Most of the sand would hug close to the bottom but the silt and clay would be sustained in the water relatively (910) uniform if there was much movement; if the movement were slow the silt part would settle out rather rapidly and the fine clay perhaps not settle out for days; that the value of a clay is improving the physical character of soils which are too sandy, and it is necessary to have a moderate amount of clay in the makeup of the soil.

BATTERSON'S TESTIMONY

HON. WALTER E. BATTERSON, Mayor of the City of Hartford, a witness for Connecticut, testified: (1225) That he has been Mayor of the City of Hartford since April 1928; that he was Mayor of the city at the time the special act was passed giving the Board of Aldermen and the Street Board

authority over the South Meadows, so-called, and authorizing the City of Hartford to issue bonds for the construction of a dike; that he recommended the passage of the legislation and appeared before the legislative committee to secure its passage; (1226) that the reasons for this Act were definitely understood; that the question of the additional $500,000 which was requested from the legislature was because of a disagreement as to the cost of the dike, and it was decided to play safe and ask to increase the bond issue; that there was nothing down on the South Meadows to protect until the development of aviation.

So far as any advocacy that he personally made in connection with the dike and its building, was predicated solely upon the desire of the present administration to see that the land was developed as an aviation center in order that Hartford might attract to itself the aviation industry; (1227) that the aviation field is known as Brainard Field, located on the banks of the Connecticut River, so as to use land planes, amphibian and sea planes; that they have an air mail station and a unit of the National Guard located at this field; that the Pratt & Whitney Aircraft Company have planes there; that there has been no demand in Hartford for a great many years for this dike as a protection against inundation in that (1228) portion of the City of Hartford; that the only portion of the City of Hartford that there has been a demand for protection from inundation has been the northerly section known as Commerce Street Dyke for which there has also been appropriated money in order to protect the Commerce Street and the State Street section of the city, but there has been nothing to warrant an expenditure of money in the South Meadows until our building of the field and our desire to make that field accomodate industry that he felt would be attracted to the city; that Pratt and Whitney have built a plant, as have also Chance and Vought, across the river since the agitation for the dike began; that it is his opinion that those concerns might have located on this side of the river had the city acted more quickly in regard to building the dike; that there are twenty

concerns or more in Hartford today that are engaged in the manufacture of airplane parts; (1229) that the object of the dike is to protect and save the field from inundation from the Connecticut River; (1230) that a dike on the northerly side of the city protects practically the entire business section of the city from Commerce Street north to State; that it is inundated in all floods of a certain height, and it is hoped that the dike will prevent any inundation in the future; that the area which the dike south of the city on the south meadows would protect is a considerable area and has been waste land with no development except a few squatters here and there; that it is hoped to build it into the industrial development of the city; (1231) that all this area is not to be devoted strictly to an aviation field; that he hopes that surrounding the field that industry will develop; that he thinks there are 480 acres now that the city owns in connection with this particular field and that he hopes that at some future time a sewerage disposal plant may be located there; that he doesn't know the total area that is going to be reclaimed from the (1232) inundations after the dikes are finished, but that it is a considerable area; that it is more than 480 acres and is easily 1,000 acres; and possibly even more than that; that the Colt Patent Fire Arms Company is located within a half mile of the aviation field; that it is on a higher level although it looks to be on the same level; (1233) that Colonel Colt built his own dike to keep the water out; that this plan of building dikes was first talked about before the War—about 1918; that there was no aviation field at that time; (1234) that he now expects that dikes will be built and that the water will be kept out.

POLLUTION

DR. CHARLES-E. A. WINSLOW, a witness for Connecticut, testified, (503) that he had made special inspections of the Connecticut River and aided in the selection of the various sampling points, and in cooperation with Dr. Rudolfs planned the methods of analysis to be used, particularly those relating to bacteria; that he went over the technique of the examinations and the records with the employees of the State Department of Health who did the actual work, and examined and summarized and tabulated the results, that so far as the chemical technique is concerned, all that he did with the chemical data was to make certain summaries of the results of the dissolved oxygen determinations; that they used in this study, as a measure of pollution from a bacteriological standpoint, the colon group of bacilli; that those are bacilli which are characteristically found in the human intestines; that it is a large group; that certain types of this colon group of organisms are found also on grains and in soil and therefore the present study was confined to the particular kind of colon bacilli, the bacterium coli which is characteristic of the human intestines; that these results (504) reported by him refer to the bacterium coli which is used as an index to sewage pollution, because the chief source from which these bacilli enter the water is domestic sewage, and their numbers in the stream vary with the amount of sewage in the stream; that these organisms are determined in the most direct method by making plate cultures; that these are made by pouring into a shallow glass dish a small amount of melted jelly in which bacteria will live, then adding a measured amount of water, one cubic centimeter, which is about 15 drops, or a fraction of a cubic centimeter, a tenth or a hundredth part, and then letting the jelly with the water mixed with it, harden, so that as the jelly sets, each bacterium is fixed at a certain point and imprisoned in the jelly; this jelly is suitable for the growth of the bacteria, and each bacterium that can grow begins to grow in that and multiplies, and inside of 24 or 48 hours a

little colony perhaps as big as the head of a pin or larger is found; that each of these colonies represents a single germ put in originally, and so, by counting these colonies, the number of single germs that went into the mixture can be told; that that is essentially the method relied upon; that the particular medium used is what is called the eosin-methylene-blue-agar; that this is a medium on which the colon group will develop and on which one can recognize by inspection the characters of the colonies of the true bacterium coli; (505) that they have a peculiar color and appearance, so that these results all represent counts of the number of bacterium coli in measured amounts of water; that the general purpose of his investigations from the public health standpoint was to determine the character of the water at the Massachusets-Connecticut state line, to see how polluted it was, with a view of determining the possible effect thereon of alterations in the flow of the stream; that as far as these bacterial counts are concerned, his results would indicate whether the water was suitable for bathing and whether it was suitable for drinking, either as it stands or with subsequent treatment; (505-506) that the number of colon bacilli would not have any particular bearing on the question of nuisance which would be indicated by the chemical dissolved oxygen studies. (507) (Exhibit C-21) shows the average numbers of bacterium coli by weeks at the state line, and the way the weeks are indicated requires a little explanation; that the week numbered "1" in July is the first week for which we have such an analysis in July; that it really is not the first week in July, but the week that began July 8th, in 1928, and July 7th in 1929, that thereafter, the same principle is followed,—the first week in August began on August 5th in 1928 and August 4th in 1929; that is, the weeks are arranged in order in the month, and numbered in that order but the actual work began in each case, on the 8th or the 7th of July, and the table gives continuous weekly averages from that time on; that the table shows numbers of bacterium coli per cubic centimeter; (508) that the graph (Exhibit C-20) was plotted directly from these figures on Exhibit C-21 and

that the weekly averages are, in general, between 200 and 400 bacterium coli per cubic centimeter; that in only one week did this number fall below 200, that 184 were recorded for the last week in July 1929, that for six weeks the weekly average was between 400 and 600; that three times it went over 700, in the fourth week of August 1928 when it reached 792; the third week of August 1929 when it reached 756; and the second week of September, 1929 when it reached 979; that fourteen individual counts during the first year and twelve during the second were over 1,000; that ten of the fourteen high counts in 1928, were at the east sampling point where the sewage of Springfield is most concentrated; that during the first year these samples were taken just as the chemical samples were taken, three at the state line at three places across the river; that during most of the second year the chemical samples were taken as before, but the bacterial samples for the second (509) year were all taken from the center of the stream at the state line, not at the mouth of any sewer; that there are various standards by which one may judge a stream; that obviously the Connecticut River is not suitable for drinking, without treatment; that the standard for a water for drinking is one colon bacillus in one hundred cubic centimeters of water, that no surface stream meets that standard, without treatment; that the water could be used as a source of water supply if it were properly treated; but that it is beyond the limits generally considered safe for treatment by filtration and chlorination alone; that according to generally accepted standards, it is a water to be first stored and then filtered and then chlorinated; that for bathing it is already distinctly unsafe; that the standards for water for bathing, established by different observers and different State Commissions, vary from four to thirty colon bacilli per cubic centimeter, and the Connecticut is away above even the highest of those standards; (510) that it would be possibly to purify this Connecticut River water for drinking purposes, providing one had storage, filtration and chlorination but that the cost would be high; that Streeter of the Public Health Service estimates that for every increase

of one hundred colon bacilli per cubic centimeter the cost of the treatment goes up about ten dollars per million gallons; that in other words, the more polluted the water is, the more colon bacilli it contains and the more elaborate must be the treatment, the more chemicals must be added, and so forth; that to his knowledge the water of the Connecticut River below the State Line has never been used for drinking purposes, except that twenty-five years ago in Hartford it was used for drinking water (511) during the winter months at which time their upland reservoirs used to freeze up and water was drawn directly from the river and that the people of Hartford suffered from typhoid as a result; that the river water was used without storage and without filtration and without chlorination; that it wouldn't be possibly today, but that was the case twenty-five years ago, and they did have severe typhoid epidemics as a result, just as they did in Lawrence; that he has analyzed the results with regard to dissolved oxygen; that speaking about the last table which Dr. Rudolfs read into the record, showing the dissolved oxygen by months for the years 1928 and 1929, in 1928 the flows remained throughout pretty high; that that was one of the wettest summers in history, in the twenty-four years of which there is a record; that the flow of the river was very high; (512) that his impression was that it was a little more than fifty percent, somewhere between fifty and sixty percent above the average; that in 1929, which was a year very slightly below the average, there is a very different picture; that aside from those general averages, in seventy-nine different instances there were individual values of oxygen saturation below 50 per cent; that on July 27 there was a value of 28 per cent registered; on August 13, a value of 26 per cent; September 4, values of 28 and 27 per cent; on September 10, 16 and 18 per cent; that these very low values were always at the central and east sampling points where they were affected by the sewage from Springfield; that the sewage from the City of Springfield is the principal immediate source of pollution, and that it finds its way along down the east bank; that streams in a river don't mix very rapidly or completely, and in all our

work we always found that the worst was at the east and then the middle and then the west bank; that the same would be true with reference to sewage of other cities, but in that particular case I interpret that as due to the fact that the sewage of Springfield tends rather to hug the east bank, that the east shore of the river is more polluted than the west shore (513) that the really significant results are shown in this Exhibit 18 of Dr. Rudolfs', because that shows the result by days; that he thinks in a case of this kind averages are likely to mislead a little, because if a nuisance is created through a certain week or month, even if general averages are good, it is a real fact, that the crucial time is in the fall when the river flow is low and at that time as exhibit 18 indicates, in 1929, in the first ten days of September, the oxygen was so low as to be oscillating back and forth pretty close to the demand for oxygen; that in other words, during that ten days the stream was in a border line condition in which any substantial removal of oxygen or water containing oxygen would have thrown it completely over the line, that was the time when these results of 16, 18, 24, and 26 per cent saturation were obtained; that it is perfectly true that if there is any oxygen present in a given volume of water at a given moment there will not be any nuisance unless there is a sludge bank underneath it; but that his experience indicates that if the condition is as close to the line as that, that at certain points of slow flow and shallow water (513) and sludge there is likely to be (514) a serious nuisance, that is why he feels justified in saying that a dissolving oxygen content much below 50 per cent saturation indicates rather a ticklish situation and certainly any substantial removal of oxygen above that present would, during a period such as this, have pushed the thing over the line, exhausted the oxygen completely and produced a real nuisance; (514-517)

Q. Now, you are acquainted in a general way with the Massachusetts legislation as to the abstraction of water authorized under that legislation of Massachusetts? A. In a general way, yes, sir.

Q. You are acquainted with the effect the restrictions imposed by the War Department have upon the Connecticut River at the state line, assuming they are complied with? A. I don't think that the change would be sufficient one way or the other during the summer months to be detected by any methods at our disposal, either way.

Q. It doesn't make any difference whether it is the Massachusetts legislation or the restrictions of the War Department? A. Just look at it from a broad—let me try to look at it not as an expert, but from a broad common sense standpoint at the beginning. Say you are putting in or taking out something well under five per cent. Now, then, none of these methods we are using on the river would check on samples taken a half hour apart within five per cent. In other words, I cannot conceive that the effect of these differences and the change in the condition at the State line could be detected by any means at our disposal.

Mr. Warren. What do you mean?

The Witness. I mean if you take out five per cent of the water in the Connecticut or five per cent of the oxygen, or if you put it in, put in five per cent more or take it out of that now reaching the state line or if you could take the river just above the state line and had a magnet and could pick out five per cent of the oxygen or put in five per cent more of oxygen, nobody would be able to tell the difference. If the experts on both sides of this case were there before and afterwards I doubt if they would be able to obtain results that would show a difference. If you take out 10 per cent, I am inclined to think you could probably find a damage or a benefit, depending on whether you are putting it in or taking it out. Then if you got 20 per cent, I am rather sure you would have a rather definite and appreciable and serious result if you diverted out of this flow. This flow was around 3400 million gallons average during that summer. Now, if you had taken out 500 million gallons out of that thirty-four, 500 million gallons of pure water, I think there would have been a very serious effect on the water at the state line and it would probably have had a greater effect on the oxygen, and would have probably been sufficient to push that river

over the danger line and make it an open sewer instead of a stream. But if you took out four hundred, you could probably detect it anlytically; it might be a little less pure. If you took out a hundred thousand or two I don't think that even a group of eminent experts could detect with any certainty any effect. We can say that every quart we take out makes it worse or every quart we put in makes it better, but within the limits we can use in analyzing you would have to have 10 per cent change, let us say, one way or the other before you could get anything that would be really significant.

Q. So that so far as the actual condition of the water is concerned it isn't going to be materially affected one way or the other? A. I don't think so.

Q. It can't be any better and you don't think it would be any worse? A. I don't think either diversion under the War Department ruling or diversion under the Massachusetts statute, as I understand it, would make any detectable difference in the water at the State line.

Q. At present. A. At present.

Q. Now, then, assuming that there is a normal growth of population and industry between the State line and Holyoke, including the city of Holyoke, will that have any increased or make any increased demand upon the water during the next ten years for oxygen? A. Why, yes. The more sewage and the more industrial wastes one puts into a river, the more oxygen is needed to take care of it. The condition of the river depends upon the balance between these two things.

Q. So that if the abstraction of water either under the Massachusetts legislation or under the War Department restriction, becomes finally settled as a permanent thing, then would you say that the increased growth of population between the State line and Holyoke would tend to create a worse condition and go over the border line during the next ten or twenty years? A. I am not perfectly clear as to that. You mean irrespective of diversion or—

Q. The diversion is out. A. Yes. The condition of that river will in all human probability grow worse on the average, aside from flow variations, from year to year, with the increase in population unless somebody takes steps to purify sewage and industrial wastes.

Q. Now you say that if there was a contribution during the low flow period of perhaps 10 per cent of oxygen from pure water it would have an appreciable effect for the good of the stream at the state line? A. I think it would. I think you would probably find that that was a detectable difference.

Q. So that if the compensation from the diversion of the Ware and Swift Rivers amounted to 10 per cent of the oxygen in spite of the amount which is authorized to be released under the War Department's restriction, you would have a substantial benefit instead of a situation which does not change the present situation? A. I think anything that added 10 per cent to the pure water in the Connecticut River would benefit it appreciably.

Q. In other words, as I understand it, you have a condition at present where the stream is approaching a border line, where it might go either one way or the other, depending upon whether you added a substantial amount of water or oxygen to the stream or whether you took a substantial amount away? A. Yes, I think the Connecticut River at State line in the autumn of a fairly average year is what I should call on the border line of nuisance.

The witness testified that he thinks the Connecticut River at the state line in the autumn of a fairly average year is what he would call on the border line of nuisance; that to take water out of the (518) Connecticut River between Hartford and the state line, for domestic use would require the treatment that has been suggested, that is, it requires storage and filtration and chlorination; that the water could be used for drinking with storage plus filtration, plus chlorination, not with filtration and chlorination alone; that assuming that there was storage and the filtration and the chlorination you could produce a water which would be suitable for drinking purposes for the people of Hartford, but it would be quite expensive; but that it could be done and he thinks it could be made comparable with the water which they have now; that this is a hypothetical question, that he doesn't know it could be stored from a practical standpoint, but assuming it could be stored for sixty days,

he thinks it would be just as good and probably safer than the present surface supply.

(520) Q. Supposing that the flow of the Swift River during that period was 1.3 per cent of the Connecticut's flow at the state line, would that amount fall within the quantities which you described as negligible and non-detectable? A. I think it would, sir, yes.

Q. And as I understood you, neither you nor the experts on our side would be able to determine with any satisfaction to themselves or to yourself, what the effect of that was, that addition or subtraction? A. Assuming, it to be 1.3 per cent of the total flow of the river?

Q. Of the total flow of the river? A. Yes; I think that it is true.

Q. As I understood you, that would be true probably up to a contribution or a diversion of about five per cent? A. I should say somewhere around there, yes.

Q. And after five per cent it would become detectable and at 10 per cent I think you stated that it would be detectable? A. Yes.

Q. And at 20 per cent it would not only be detectable but serious? A. Yes, sir.

Q. And that applies with reference to the amount of oxygen in (521) the water? A. Yes, that applies to water which is relatively pure. I am assuming in that the water diverted is water diverted at the upper part of the stream before it is heavily polluted. If you take out one-fifth of the water at the state line you would not change the percentage relations at all.

Q. Would you say that that same conclusion was true as regards the public health? A. Well, yes, I should, because you would have to have an enormous change in quality on the one hand and an enormous improvement, to make the river safe for bathing. You would have to have a very large change for the worse to make it impossible to purify it by storage, chlorination or filtration. I should say then that a change of five per cent either way was not of practical moment.

Q. Either as regards the purity of the water or the effect of the water with respect to public health? A. Yes, sir.

Q. You made these investigations at other points besides the State line? A. Yes, sir.

The witness testified that the condition of the river improves between the state line and a point above Hartford; that it improves very rapidly immediately below the state line, as a result of the dam at Thompsonville; that there is long storage and aeration and there is very marked purification on the way down from state line to Connecticut's sampling station F, above Hartford; (522-523).

Q. How much better is the water when it gets to Hartford before the Hartford sewage enters it, than it is at the state line? Can you tell us that? A. I have results both for dissolved oxygen and bacillus coli, if you would like them.

Q. I should like both. A. In 1928 the dissolved oxygen averaged, you remember, 74 at the state line. It rose to 86 below Windsor Locks.

Q. That you would call pretty good,—86? A. Excellent. In the second year it rose from 54 to 79 in the same distance.

Q. Seventy-nine would stand pretty high, wouldn't it? A. That is good, yes.

Q. That was the average for the period? A. That is the average for the period in each case. Then the dissolved oxygen below the dam dropped somewhat, for the station above Hartford, dropped from 86 to 72 in the first year, and from 79 to 69 the second year. The bacteria, on the other hand, were lowest in both years at the station just above Hartford. They take longer to die out than the oxygen takes to be reintroduced by aeration. Their numbers fell from 395 at the state line to 72 above Hartford.

Q. Would that figure be reasonably satisfactory or is that high, as compared with other rivers? A. That is a very good river figure for a river in a settled area, yes.

Q. If there would be any determinable difference, how much difference do you think there would be in the cost of purifying the Connecticut River at Hartford, in the way you have suggested, by storage, filtration and chlorination, before and after this Ware and Swift River diversion? A. I have tried to indicate that the

difference due to the abstraction of one per cent or two per cent of water is so slight that it cannot be measured in any concrete way. It is a purely theoretical damage or advantage when we are within these limits.

Q. For any purpose? A. For any purpose that I know of we cannot determine within one or two per cent;

(524) The witness testified that he has no opinion as to the effect of a diversion of one or two per cent on navigation, power or fish life but is confined to public health; (525-526-527) that the following streams in most of which analyses were taken at points in the stream that were used or proposed to be used for water supplies, these streams being reasonably comparable with the Connecticut River; that these averages are for a year, and recent years in each case;

	Colon bacilli per cubic centimeter
Mississippi, above Minneapolis	13
Maumee, at Toledo	20
Allegheny, at Pittsburgh	21
Ohio, at Louisville	22
Grand, at Grand Rapids	26
Delaware, at Trenton	29
Ohio, at Cincinnati	30
Mississippi, at St. Louis	31
Maiden Creek, at Reading	42
Merrimac, at Lawrence	42
Mahoning, at Youngstown	54
Schuylkill, at Philadelphia	59
Connecticut, above Hartford	68

The Connecticut above Hartford is the best point in the river.

Missouri, at Kansas City	159
Hudson, at Albany	194
White River, at Indianapolis	225
Connecticut, at the State Line	378

(527) that almost all of these figures other than that for the Connecticut River, include the total colon group so that would

tend to make them higher than ours which include only the true bacterium coli; that if he had included all the bacterium coli count the result would have been higher on the Connecticut River; that in study of water supply proposition, the whole colon group is used because no foreign matter whatever is wanted, but for pollution he thought it best to use specifically the intestinal coli; that the following figures are for the per cent of dissolved oxygen; the Hockanum River varied from 92 at best to 58 at the worst; the Raritan in New Jersey in 1927 varied from 89 at best to 52 at the worst; the Naugatuck in Connecticut in 1919 varied from 98 down to 50; that the Massachusetts results general do not show dissolved oxygen but in 1900 the Merrimac went down to 32; that the Connecticut in 1929 went down to 16, a single observation; the Mississippi in August, 1929, varied at different times from 100 per cent saturation to 10 below Minnesota and St. Paul; some August figures in which the Connecticut in 1929 is comparable with a series of Ohio streams, streams tributary to the Ohio River, a public health service study:

	Colon bacilli per cubic centimeter	
Tennessee River averaged	88	in August
Scioto	87	
Beaver	85	
Ohio, a number of stations	83	
Alleghany	82	
Licking	82	
Cumberland	79	
Monongahela	76	and the
Connecticut during this past August	51	

(530) that the Connecticut for August 1928 averaged 70 at the State Line; that the average above Hartford for August 1929 was 68 and in 1928, 70; (531) that conditions can be improved by sewage disposal plants; that it is possible to take the sewage of a city and turn it into drinking water; that there is one plant on the New York City watershed where the purified sewage of Mt. Kisco is purer than the brook into which it flows; that if the sewage in the Connecticut River should in the

future become serious because of the increase in population or for any other reason, the danger would be practically eliminated if the cities along the river adopted sufficiently elaborate sewage disposal plants.

DR. WILLEM RUDOLFS, an expert witness called by Connecticut, testified (418) that his investigations included as far as the character of the stream is concerned and the character of the pollution mainly three tests in addition to some minor ones; namely, dissolved oxygen, biochemical oxygen demand, and bacteriological examinations; that in addition, more complete chemical tests of the water were made at less frequent intervals; that two forms of pollution were considered, one coming from human beings, domestic sewage, and the other pollution coming from industries, industrial waste; that the investigation included domestic sewage, industrial sewage and sludge deposits in the stream; that sludge deposit is that material discharged either by human beings or industries that is heavier than water and if the velocity of the stream is insufficient, that material will settle, forming first in (419) quiet places and around bends, in banks, slight deposits which will accumulate later on; that the first deposits usually occur below sewer outlets; that the rate of flow of the stream has something to do with the existence of these sludge deposit beds; (420) that the amount of water has some connection with the uncovering of these sludge deposit beds because if there is very low water, naturally, the sludge deposits will come above the water line; that the effect is that these sludge deposits will come above the water line; that the effect is that these sludge deposits are susceptible to being decomposed and naturally the bacteria present in the sludge beds continue to work, and all kinds of foul odors begin to occur; that they selected about fifteen sampling places in the Connecticut River below the Massachusetts-Connecticut State line, and seven above the State line; that one was at the State line; that samples were collected at a given time of day, put on ice and transported to the

health department laboratory in Hartford and analyzed, except that a portion of the analytical procedure had to be carried out in the field, namely, that for dissolved oxygen; that otherwise the time of transit might make some difference; that in the laboratory the analysis was completed; that in order to determine the hour (given time of day) for taking samples, samples were taken over a period of several days, one and one-half hours apart, three samples across the river at mid depth; that the results were plotted over these several days and the average for the whole river at that particular point was determined; that the point on the curve which was nearest the (421) average plotted on time gave the average condition for the whole day and so the particular hour of the particular day which would give the average condition for the stream for a whole day was found; that if but one sample was taken, say in the middle of the stream, the velocity and the volume of water might be different from the places nearer to the banks, so samples were taken at a place one-quarter from the east bank, one-quarter from the west bank and another sample in the middle of the stream, so that there were three samples across the stream and all taken at mid-depth, mid-depth being half way between the bottom and the surface; that the samples were taken at mid-depth because if they are taken near the surface the conditions might be a little better than the average due to reaeration conditions; that if they were taken close to the bottom the results would be a little worse because there might be a sludge deposit and the oxygen demand might be greater than the average of the stream; (422) that mid-depth gives the approximate or average condition of the stream; that dissolved oxygen is the quantity of oxygen which is dissolved in water at a given atmospheric pressure in a given amount of water; that pure water, for instance, absorbs more oxygen than impure water or sewage; that impure water is capable of carrying only a given quantity at a given temperature and given atmospheric pressure; that when water contains all the oxygen it is capable of absorbing when intimately mixed with air at a specific temperature and pressure, it is said to be saturated;

that for instance, at about 50 degrees Fahrenheit and a definite pressure of 29.92 inches barometric pressure, water contains 11.33 parts per million of oxygen; that polluted streams are rarely saturated with oxygen, and the results are, therefore, often expressed in percent saturation; that if the percentage of saturation is low the stream is heavily polluted, and if the saturation is below a given quantity, nuisances might occur or first the fish life might be interefered with or affected; that that is the significance of the expression percentage of oxygen saturation; that another expression of oxygen saturation is direct in parts per million of oxygen dissolved; that from this can be calculated, provided the temperature and the flow of (423) water are known, the number of pounds of oxygen present in the water at any given temperature; that parts per million means that if there is a million pounds of water containing one part per million this water would contain one pound of oxygen; that if there are a million gallons of water with one part per million oxygen there would be 8.33 pounds of oxygen in the water; that biochemical oxygen demand is the amount of oxygen which is consumed by impurities in the water in a stated period of time and at a (424) definite temperature; that five days' oxygen demand at 20 degrees Centigrade (68°F) in our studies is generally used; that from that can be calculated also 10 and 20-day demand, or whatever is wanted; that the biochemical oxygen demand test is the most important test in gauging the conditions of the stream; that by studies of biochemical oxygen demand the load which is placed on the river by individuals, towns or industries can be determined, and the progress of natural purification which takes place in the river when it flows down, can be shown; (425) by "load" is meant the amount of polluting material put in the river; that from studies it is known that the excretion of soluble and solid material from humans has a definite demand for oxygen; that each day the biochemical oxygen demand of domestic sewage is around two-tenths of a pound of oxygen per person contributing; that the population equivalent for any given quantity of sewage, either discharged or

already present in the river, can be calculated by biochemical oxygen demand; that the samples at the Massachusetts-Connecticut State Line were collected at 8 o'clock in the morning during the year 1929; that the results obtained were average conditions for that day, at that particular point; that during 1929 these samples were collected daily at the State Line from July 8th (426) to September 14th; that in 1928 they were collected from June 17th to November 18th (427) at the State Line; that during the period of July 8 to September 14, 1929, the percentage of oxygen saturation was from 20 to 29 one day; eight days from 30 to 39; sixteen days from 40 to 49; twenty days from 50 to 59; seventeen days from 60 to 69; six days from 70 to 79; and one day from 80 to 89; that the least at any date observed was 23 per cent saturation, while the maximum was 83; that the average for the whole period was 54 per cent saturation; that the number of days the saturation was below 50 per cent was as follows: out of the 69 sampling days, 25 times the saturation was below 50, or a little over one-third, namely, 36 and a fraction per cent; that this per cent of saturation, means the proportion, compared with what is called complete saturation of the water at that temperature and place; (428) that this is a direct indication of the degree of pollution; that the smaller the percentage of saturation, the greater the pollution; that if there is 20 per cent saturation, then the pollution is much greater than it is when it is 40 or 60 percent; that Exhibit C-16 shows that on July 8, 1929, there was a definite saturation, but on July 21st it was lower; that this shows how the pollution condition progressed during the summer plotted in weekly averages, for convenience; that there was a progressive reduction in the percent of saturation in the summer months between the week of July 8th to the week of September 8th, 1929, (429) finishing with September 14, 1929; that the values are higher on some days of the week than on others but that the Exhibit C-16 shows weekly averages; that Exhibit C-17 is a summary of oxygen results expressed in parts per million for that same period, showing the average for the whole period, the number of samples at

which (431) certain saturations occurred; also the average dissolved oxygen in parts per million, for a number of samples; that the average temperature conditions, or the average temperature of the water during the summer was 22.2 degrees Centigrade which is about 72 degrees Fahrenheit; that pure water contains when saturated, 8.8 parts per million of oxygen at 20 degrees Centigrade, or 72 degrees Fahrenheit; that even at the highest temperature observed in the river, (432) the water, if it had been pure, would have contained at least eight parts per million; that the average saturation was only 54 per cent; that in 82 individual cases the dissolved oxygen was below four parts per million; on 44 occasions, below three and a half; on 17, below three parts per million, while in two samples the oxygen was below two parts per million; (433) that as to the relation between dissolved oxygen and biochemical oxygen demand:

> "organic matter present in sewage or industrial wastes is in a state of putrefaction or susceptible to putrefaction. As soon as the putrescible matter reaches the river, it begins to use up the oxygen in the water. Since the oxidation of the waste is brought out by biochemical activities or agencies, the sewage and waste are said to have a certain biochemical oxygen demand. The sewage from one person is found to have a 20-day oxygen demand of about two-tenths of a pound of oxygen per day. Industrial wastes vary greatly in strength, (434) but on the basis of the pounds of oxygen demand, it can be calculated into population equivalents; knowing the amount of oxygen required by a certain volume of industrial waste, knowing the oxygen demand of a certain person, it is a simple arithmetical calculation to state the population equivalents. In industries, as I said, they vary greatly. Some of them have a small oxygen demand, others great. There are above the State Line quite a number of wool-scouring and dyeing industries and the amount of product produced per year is in direct relation with the amount of polluting matter. So if we had a thousand pounds of product produced per year, we know that it has a population equivalent, according to the United States Public Health Service Bulletin 171, of

> 4.15 persons. We have used a slightly lower figure. That means that it a particular plant which is in Massachusetts, where they have about seven hundred employees, the population equivalent of that industry is 35,000. So the waste has a definite oxygen demand and sometimes considerably greater than the persons".

That this is strictly industrial population equivalent, although industrial wastes might be mixed with the domestic sewage; that if the amount of oxygen in the river is insufficient, fish life is affected, and if the oxygen content is nearing exhaustion (435) odor nuisance begins to occur, even if there are no sludge banks present; that there is a higher oxygen requirement for fish life than to prevent nuisances; that certain fish require more oxygen than others; for instance eel and carp and catfish require less dissolved oxygen than fish like bass, pickerel and trout, which like cleaner water; that the amount of oxygen required by fish like shad is a minimum of 3.5 to four parts per million; that when the dissolved oxygen is lowered beyond this point, the fish begin to migrate, if they can, or if they cannot they begin to suffocate because there is not sufficient oxygen in the water for them to live; that the oxygen balance in the Connecticut river at the State line between September 1 and 11, 1929, is shown on Exhibit C-18; (436) that during a certain portion of the year—September 1 to September 11 is taken—on Exhibit C-18, the amount of oxygen in the river is plotted as a dotted line and the demand of the river is given as a solid line, showing that at sometimes during that period the oxygen demand of the river was the same as the oxygen which was dissolved, so that there was nothing left if all the demand was satisfied; that the pollution was such that all the oxygen should have to be taken out of the river to satisfy the pollution on that particular day; that other days there was more oxygen than was necessary to oxidize (437) all the polluting matter in the river; that at another instance on the 10th there was less oxygen; that on the 4th the oxygen demand and the dissolved oxygen were just equal; so that if all the organic matter had been oxidized on that day

there would have been no oxygen whatsoever in the river; that the difference between the oxygen demand and the oxygen dissolved is referred to quite often as the oxygen balance; that the oxygen balance is oxygen that might be available for further oxidation, as a reserve; that on that particular date if all the organic matter was oxidized by the oxygen in the river it would be all used up, so the demand on the river was equal to the amount available, where at other places there was more than the demand and at one instance there was less than the demand; (438) that in the third column of Exhibit C-17, the average biochemical oxygen demand in parts per million is given as compared with the oxygen dissolved present; that there were 405 samples all told and out of these 405 there were 182 where the oxygen balance—the oxygen available—was less than two parts per million; in 82 cases it was less than one and a half parts per million; in 44 cases less than one part per million; (439) that these are the lowest 182 out of all the 405 samples taken; that 223 had a balance of more than two parts per million; 182 a balance of less than two parts per million; that in a number of cases as given here—in six cases—the oxygen demand was greater than the oxygen available; (440) that this table shows that in six samples of 405 there was no oxygen balance, that oxidation of all the organic matter would consume all the oxygen; (441) that in Exhibit C-19 the upper line shows the dissolved oxygen throughout the summer; that the broken line labeled oxygen balance shows the surplus of oxygen available, and the line labeled b.o.d. is the 5-day biochemical oxygen demand; that fish, in order to live, need an amount of oxygen of 3½ to 4 parts per million, that is where the balance comes in; that there were a number of days that the river was so polluted at the State line that fish like shad had either to migrate or die; that the oxygen balance as shown by the last column (442) shows that the oxygen balance was for a number of instances less than the oxygen required by the fish, if the river was used for oxidation of the sewage polluted matter; that three and one-half to four parts per million are required by fish; (443) that on some days during each of those weeks

it would be greater and some days it would be less, but this would be the average;

> "when the stream has sufficient velocity to prevent deposits and contains some dissolved oxygen, odor nuisances are negligible, but if the velocity is low, if it is lower, as frequently occurs in the summer, so that solids in suspension will settle out, sludge banks will occur and these deposits, first in quiet places and so on, begin to work their way down stream (444) to an extent. Sludge deposits, since they are partly organic in nature, and the bacteria are there, exert a certain oxygen demand on the overlying water or the water that flows over them, and take out the oxygen which is necessary. When the oxygen in the water above is insufficient to satisfy all the demand, then we get conditions where odors begin to occur; we get putrefactive odors, odors like material that is rotten, disagreeable odors. Sometimes when it begins you have at first the distinct sewage odor and that increases gradually. During high flows these sludge deposits may or may not disappear. During the summer the oxygen content of the water of the river is usually low, because it depends on the temperature. The higher the temperature the less oxygen in the water. At the same time the temperature stimulates the bacteria to work faster, so that they need more oxygen. There is less oxygen in the water and there is a greater demand. Then, at the time the flow of the river is also low. You have three factors, the low flow of the river, a great demand, and less oxygen in the water. Then the sludge deposits in the river give you the poorest conditions in the river and give you the greatest pollution in the river, during the low flow and high temperature, and we have sludge banks, all these three factors together." "I said that high flows have a tendency to remove sludge deposits which have deposited during the summer (445) or spring, and have a tendency to remove them, scour them out, if you wish to use that term, or drive them down."

That any flood flow would have a tendency to drive out or scour out that sludge which was retained during other times; that a survey of the river was made trying to find out what the sources of pollution were which had been found to exist at the State line,

and so both an industrial survey and also a survey of the conditions of sewer outfalls and soon was made; that the surveys of industries along the Connecticut River and tributaries south of the dam at Holyoke, consisted of an inspection of the sewer outlets, industrial sewer outlets discharging waste into the water; that very extensive field observations were made; that samples were taken for the purpose of estimating the quantity and the nature of the materials, and so on, and at the particular time when that was done, the textile industry and to a certain extent also the paper industry were suffering (446) from business depression, with the result that in many cases the waste was less than it would ordinarily have been; that fish life depends upon the dissolved oxygen (447) not necessarily on the oxygen balance; (449) that it is the amount of dissolved oxygen that determines the migration or possibly the life of the fish, not the oxygen balance; that the dissolved oxygen requisite for fish is 3½ to 4 parts per million; (450) that the survey for domestic and industrial waste conditions in the river not only included between the State line and Holyoke but extend much further up the river about 320 miles to (451) even beyond the Massachusetts line, into Vermont and New Hampshire, to see whether there were any possible sources of pollution which could contribute to a marked extent to the conditions; that for 1929, the summarized results show that the New Hampshire and Vermont contributing population, which is sewered population, within that drainage area of the Connecticut River, was 73,150, Massachusetts, 407,590; that the industrial wastes of Massachusetts, in population equivalent, was 139,000 people, making a total of 619,740; that the survey was made away up the river, and all of its tributaries, in order to find other possible sources of pollution which were materially effective in any condition existing at the State line; that the survey was made for about 320 miles upstream, above the mouth of the river; that the bulk of the waste was discharged into the Connecticut by the towns of Holyoke, Chicopee and Springfield, with a considerable quantity coming from the Chicopee River, which is a tributary, coming in just above Springfield; that the Ware and Swift

Rivers are tributaries of the Chicopee; (452) that very little industrial waste comes from New Hampshire and Vermont; that by the time it reaches the state line it is all oxidized; that the distance is so long that the oxygen in the water has taken care of it; that the results between the state line and Holyoke show that the amounts of industrial wastes and domestic sewage waste, again expressed in population equivalents, are about 400,000 persons per day, 65 percent of which is industrial; (453) that as to population equivalent, a given quantity of waste can be calculated into population equivalent because how much oxygen is required for a person is known; that one can translate that directly into industrial wastes; that is what we mean; (458) that during the period July 8 to September 14 the average flow of the Connecticut River at the state line in 1929 was 5,050 cubic feet per second; that the average percent saturation of dissolved oxygen was fifty-four, and the average dissolved oxygen was 4.73 parts per million; (459-61) that based upon the average flow for 1929 as 5,050 cubic feet per second and an average percentage of dissolved oxygen during that period, assuming the same conditions to exist as existed between July 8 and September 14, 1929, and taking into consideration the increase in population and industrial growth, that the estimated equivalent population demand, the dissolved oxygen saturation and the dissolved oxygen in parts per million at the state line for each ten years from 1929 to 1970 are: (corrected figures, pp. 537, 538)

Year	Equivalent Population	% D.O. Saturation	D.O. P.P.M.
1929	750,000	56	4.9
1940	900,000	50	4.4
1950	1,080,000	45	3.96
1960	1,290,000	41	3.61
1970	1,540,000	37	3.26

that this is based upon the population for the principal counties contributing above the (460) state line, draining into the river; the counties were, in New Hampshire—Cheshire, Coos,

Grafton, and Sullivan; in Vermont—Caledonia, Essex, Orange, Windham, Windsor; in Massachusetts—Franklin, Hampden and Hampshire; that the basis for figuring those increases in population was the United States census figures for a number of years back; (462) that equivalent population means the population including the industrial equivalents, because there is a definite load on the river and the basis of the figures is the load which the river must carry whether it comes from population or the plants which may exist upon the stream; that taking the river as it was, as a definite flow of 5,050 cubic feet per second, as to whether that was larger or smaller than the usual summer flow, did not very much concern him in these calculations; that he only had two years' actual records of the river; (463) that the condition in the river in 1928 expressed in percentage of oxygen was better than in 1929; that there was more water in the river in 1928; that the reduction in the amount of water in the stream has an effect on the condition of the river; (466) that the extent of the sludge deposits at the state line in October 1929, was about 310,000 square feet with an average of about 1.4 feet in depth, or a volume of 435,000 cubic feet; that the volatile solids amounted to about 1,000,000 pounds, with a biochemical oxygen demand of 108,400, with a population equivalent of 500,000 to be satisfied from the water in the river; (467) that he made two sludge surveys in 1928 but the real investigation was done in the spring and fall of 1929; that one started in April and ended in June, and the other started in September and ended in October, October, or beginning of November, possibly; that in June 1929, approximately the same conditions were found as in October, 1929; that surveys were made north of the state line between the state line and Holyoke; that in the spring a number of sludge banks around Springfield and Holyoke were investigated and the same thing was done in the fall; that using the sludge bed at Springfield, at the lower bridge as an illustration, (468) the area in early summer, in June, was 104,900 square feet, in the fall 178,000 square feet; that the volume in the early summer was 108,000, in the fall 195,800 cubic feet;

that the biochemical oxygen demand in the summer was 54,950 and in the fall was 64,950; that that indicates an accumulation of sludge deposited by the towns there, or thereabouts, with a definite increase in oxygen demand during the summer months from June until September or the beginning of October; that he doesn't think that it can be said that the amount of water which flowed during that period was sufficient to satisfy the demand because the velocity of the stream would have something to do with it; that if solids settled down at a rapid rate, it would take some time before the biological activities are demanding oxygen, so it cannot be definitely stated that the volume of water is sufficient, but that it is assumed that the water was satisfied with oxygen at that particular place, flowing over the sludge beds; that he would say that the sludge beds apparently took out, in addition to the sewage which (469) was discharged and didn't settle, a large volume of oxygen; that when the survey was made the sludge banks were partly exposed at low waters, depending on what day they were seen; that the amounts of dissolved oxygen at the state line shown on Exhibit C-19 represent the amounts of oxygen left after the sludge banks had absorbed oxygen from it; (470) that from an examination of the analyses which was made of the water taken at the state line, in the manner that has been described, the witness' opinion, as to the quality of the water in the Connecticut River at the state line, at the present time, is that it would need considerable treatment before the water could be used as a water supply; that it could be used by treating it; that in regard to fish life, the water at the state line is just on the border line; that in regard to bathing, the river at that place is polluted, and is dangerous for bathing; (471) that "present time" means the period under the condition found while the investigations were being made, (472) which was during the low flow of the stream; (473) that if all over 85,000,000 gallons per day were to be taken from the Ware River and 20,000,000 gallons per day would be released from whatever storage is provided for on the Swift River, and that amount of water is diverted during the summer months, under

conditions as they existed during the period from July to September, 1929, that would have an adverse effect on the condition of the river from the standpoint of sanitary conditions; that any reduction in the amount of water would have an adverse effect; that assuming the restrictions of the War Department are complied with, during a period similar to the period between July and September, 1929, it would probably have no effect (474) upon conditions in the Connecticut River at the state line; that the river would not be any safer to bathe in; that it would not be much better, nor much worse; that it would be possible during a period such as was the period between July and September, 1929—to materially improve the conditions at the state line, if a substantial amount of water was added to the natural and normal flow of the stream; that it would take quite a volume; that there would have to be quite an increase in volume in order to make a material impression; that it would have to be a lot more substantial than that added by the War Department for navigation purposes; (475) that these remarks related to bathing, water supply, fish life; that perhaps it will affect, also the sludge bank formation, because the velocity would possibly increase and the scouring effect would be a little better; but it would have to be a large addition; that considerable would have to be taken out to make very much noticeable difference; (477) that there have been compiled for the year 1928 by weekly averages, the percentage of oxygen saturation, the dissolved oxygen in parts per million, the five-day biochemical oxygen demand in parts per million, the temperatures and the discharge of the river at Thompsonville in cubic feet per second, as follows:—

Week Starting	Per Cent Saturation	Temperature (Centigrade)	Dissolved Oxygen	B.O.D.	Discharge of River
June 17	84	18.2	7.9	2.5	15,900
June 24	85	19.4	7.8	2.2	13,100
July 1	86	22.4	7.6	1.6	15,800
July 8	78	24.6	6.6	1.8	9,770
July 15	70	24.6	5.9	2.0	9,920
July 22	67	23.4	5.8	2.0	10,100
July 29	70	22.5	6.1	1.5	11,400
August 5	67	22.8	5.8	1.6	14,400
August 12	72	24.0	6.1	1.4	11,500
August 19	61	23.5	5.2	1.5	8,200
August 26	79	20.9	7.1	2.0	22,900
Sept. 2	82	19.5	7.6	1.6	15,800
Sept. 9	74	19.2	7.0	1.7	9,070
Sept. 16	84	18.6	7.9	1.6	13,800
Sept. 23	79	15.3	8.0	2.1	9,010
Sept. 30	78	13.5	8.2	2.5	8,170
Oct. 7	76	14.6	7.8	2.8	7,210
Oct. 14 (479)	79	14.9	8.0	2.2	8,850
Oct. 21	83	12.7	8.9	2.3	14,500
Oct. 28	81	8.2	9.6	3.0	9,900
Nov. 4	85	7.0	10.3	2.7	9,440
Nov. 11	85	5.5	10.7	3.2	8,130

The averages for that whole period:—

Per cent saturation	77
Temperature	18°C
Dissolved Oxygen parts per million	7.5
Five-day biochemical oxygen demand parts per million	2.1
Discharge in cubic feet per second as calculated by weekly averages	11,670
As calculated by daily averages	11,640

(480) The averages corresponding to the period of 1929, July 8 to September 14, are as follows:—

Temperature	22.2°C
Dissolved oxygen parts per million	6.3
5-day bio-chemical oxygen demand parts per million	1.7
Discharge cubic feet per second	12,310

12,310 cubic feet per second is the average discharge corresponding to the year 1929, when the discharge was a little over 5,000 cubic feet per second, as he said this morning;

(482) that he did not say that the addition required by the War Department would not make any appreciable difference; that naturally every pound of water that is put in improves the river; (483) that he meant to say that any quantity that is taken out will of course be detrimental and any quantity that is added will be beneficial, but that the amounts added are not so very large, so the improvement will not be very great, in view of the condition of the river at present, because it is badly polluted; that that is what he meant to convey; that suppose there is 5,000 cubic feet per second flow in the river, if 150 cubic feet per second is added it would help; that as to how much, appreciably, that depends upon what meaning is placed upon appreciably; that if by appreciably is meant a very large extent, he would say no; (484) that he figured roughly 150 cubic feet per second is approximately 100 million gallons of water a day; that that would mean a population equivalent of 37,000; that if that much water were added, the sewage of 37,000 more people could be handled by the stream; that those are rough figures and it might be a few one way or the other; (485) that each cubic foot per second would take care of one-one hundred-fiftieth of 37,000 people; (486) that if instead of adding 150 cubic feet per second, 150 cubic feet per second were subtracted or diverted the same results would be obtained, the water being able to take care of thirty-seven thousand less people; that is because it is based on the volume of water containing a certain amount of oxygen; (487) that the water he has in mind is in the state of nature, where you have good water; (488) that the contribution into the Connecticut would not be pure water even though it started pure from the Ware or Swift River Reservoir; (489) that the quality of the water of the Swift River at West Ware is good; that the water of the Ware River at Coldbrook is slightly less good; that the difference is very, very, very small and that they are

both good, potable waters; (490) that the condition in the Connecticut River was better in 1928 than in 1929, materially better; that the average flow at the state line was about two and one-half times as great, during the period; that in 1929 it was 5,050 cubic feet per second and in 1928 it was 12,310 cubic feet per second for the same period; (491) that so far as the Ware River is concerned the diversion authorized by Massachusetts, had it been in effect, would not have affected in any way the water in the Connecticut River during that period, July 8th to September 15th, 1929, if Massachusetts observed the requirements of the War Department; that as to the Swift River, if the order of the War Department had been in effect during that period, in 1929, there would have been more water in the river; (493) that as far as the pollution of the river is concerned, if this water plan is carried out, and if the two orders of the War Department are obverved by Massachusetts, the condition will be an improvement in the Connecticut River water at the State line, under such conditions as existed in 1929; that the improvement in the Connecticut River by this added supply (i. e. the release from storage in the proposed Swift River reservoir) is more with low water; that the addition coming in a period of lowest water is more helpful than it would be in high water; (497) that the weekly average temperature of the water at the State line between July and September, 1929, was for the week beginning July 14th, 23.6; for the week of July 21st, 23.6; for the week of July 28th, 25; the week of August 4th, 22.2; the week of August 11th, 22.8; the week of August 18th, 21.7; the week of August 25th, 21.4; for the week of September 1st, 21.8; and for the week of September 8th and ending the 14th, 21.7; the average, 22.8; and corresponding temperature over the period of the previous year, 22.6; (499-500) that Exhibit D-2 shows that under the requirements of the War Department there would have been, during 1923, an increase or contribution of water from the Ware and Swift during 12 weeks, almost three months, from the beginning of July to the middle of October; that these contributions would have varied from five to 54 cubic feet per second; that assum-

ing that the average contribution was 45 cubic feet per second it would have amounted roughly to one and one-half per-cent of the flow of the Connecticut River at the State line which is shown by Exhibit D-2 to have been 3000 cubic feet per second; (538-543) that Dr. Rudolfs read into the record his daily determination of dissolved oxygen in parts per million and of water temperature at sampling stations on the Connecticut River at the Massachusetts-Connecticut State line (his Station A), at a point above Hartford (his Station F), and at a point below Hartford (his Station J), during the period September 1 to 11, inclusive, 1929, as follows:— (543a)

Station Location	A State Line		F Above Hartford		H Below Hartford	
Date	D.O.	Temp.	D.O.	Temp.	D.O.	Temp.
Sept. 1929	P.P.M.	°C	P.P.M.	°C	P.P.M.	°C
1	4.3	20.2			5.8	20.8
2	3.85	21.2			5.2	21.9
3	3.25	21.7			5.7	22.6
4	2.9	22.2			4.6	23.9
5	4.85	22.3	5.8	23.6	5.0	24.2
6	4.3	22.5			—	—
7	3.5	22.6			4.5	22.2
8	3.35	23.2			—	—
9	3.7	23.5			—	—
10	2.0	22.7			4.2	24.0
11	4.5	22.0			—	—

(544 et seq.) that a complete list of his sampling stations at the State line and below are as follows:—

Station A—Connecticut River at Massachusetts-Connecticut State line.

Station B—Connecticut River at Thompsonville bridge, (about 2½ miles below State line).

Station C—Connecticut River opposite lower end of the Northern Connecticut Power Company canal.

Station D—Connecticut River directly west from South Windsor and one-half mile below the mouth of the Farmington River.

Station E—Farmington River at highway bridge at Windsor.

Station F—Connecticut River 500 feet above N. Y., N. H. & H. R. R. bridge at north end of Hartford.

Station G—Hockanum River at mouth.

Station H—Connecticut River one mile below mouth of Hockanum River.

Station I—Connecticut River at Wethersfield.

Station J—Connecticut River at Rocky Hill.

Stations K-1 & K-2—Connecticut River at Middletown.

Station L—Sebethe (Mattabesset) River at highway bridge near mouth.

Station M—Connecticut River, one and one-half miles below Middletown.

Station N—Connecticut River at East Haddam bridge.

Station O—Connecticut River at Saybrook bridge.

Station P—Park River at mouth.

(547) that the condition in the Connecticut River as shown by the results of his tests in 1929 does not improve between Station A at the State line and Station B at Thompsonville, in fact is a little "poorer" at Station B, "but comparing the results at Station B with Station C, which is further down the stream, below the Enfield dam, the condition improved very

materially;" (547) that the results of studies which were made to determine a reason for the betterment of conditions on the river between the Massachusetts-Connecticut State line and the station just above Hartford known as Station F, which conditions improved very materially in 1929; that there is a dam of about six to seven feet high, and below that dam there is a stretch of about a mile or a mile and a half of ripples, over which the water at low tide goes continuously and is reaerated very vigorously.

(548) "Q. Assuming that you have a dam at Kings Island, of substantially the same height as the present dam, but you increase your pondage, will that have a tendency to either benefit the conditions or make them worse, so far as the chemical analysis of the water is concerned? A. Suppose that you put in (549) another dam there and back up the water to the level of the first dam, I would say you might cut your reaeration and your results about in half.

Q. That is from the chemical and not from the bacteriological? A. I am not talking about the bacteriological.

MR. WARREN. It is just the other way with the chemical side as compared with the bacteriological side?

THE WITNESS. It would not help with the chemical.

MR. WARREN. You heard what Professor Winslow said?

THE WITNESS. Yes.

MR. WARREN. That the increase in the pondage would help from the bacteriological standpoint, and you say it would cut in half the present improvement in the oxygen?

THE WITNESS. If I had to give an opinion on the bacteriological side I would have to know first how long that ponding would be, before I could say anything about it. Suppose it is 30 days, I would say yes, it would

materially help bacteriological removal. If it is an hour, I do not see what difference it would make."

(550) That some 24 hour rests were made at the State line from the result of which it was determined at what hour the average sample would be obtained; that this process was repeated several times; that he wanted to check up and see how it held all summer with different flows; that most of the time they were made at 8 o'clock; (551) that in 1928 they sampled every hour and a half for seven days, night and day, and from that, constructed curves for every day and from that took the average condition for each particular day they were going to sample, so that the hours varied throughout the week between 8 and 12 in the morning; that those tests were made in June before starting the regular survey which has been reported here; (552) that the survey was made, beginning on June 16th and ending on June 26th; (553) that every day a sample was taken during the regular period in 1928; that (554) in 1929 between July 8th and July 27th another survey was made similar to those done for ten days the year before at hour and a half intervals for twenty-four periods on July 27th and 28th; that another sampling period of an hour and a half sampling was taken on August 13th and 14th and again on August 25th and 26th; that they found that the average conditions were near 8 o'clock in the morning; that outside of these special periods of sampling, one sample was taken each day——

Q. Will you agree that whatever oxygen the water did have after the sludge bed had exerted its influence on the water as it came down the stream, had been exerted when that particular water reached the State line and that, therefore, you know what kind of water Connecticut got at the State line on the day that you took your sample? A. The four specific days, yes, but not for the general period, because then we have to bring in that picture of accumulation.

Q. You took a sample every day? A. For a certain period of the year, yes, sir.

Q. And for that period the samples showed the kind of water that Connecticut got at the state boundary, no matter how big the sludge bed was? A. Yes.

Q. Whether it would have continued to get that kind of water or not, of course you cannot tell after you stopped taking your samples? A. Yes, sir.

Q. But if samples had been taken continuously from the time you stopped, then you would have gotten a picture for that larger period. A. More complete.

Q. And you could have determined more definitely and accurately what the evil effect of the sludge bed was; is that right? A. Yes.

(571) That his surveys indicated sludge beds as follows:—

Location	Area in sq. ft.	Average Depth in feet
Holyoke opposite Hegy works	90,000	0.33
Holyoke-Springfield line	103,000	1.65
Chicopee, below bridge	161,000	1.40
(572)		
Springfield North End Bridge	266,000	1.21
Springfield at railroad bridge	520,000	1.71
Springfield, Memorial Bridge	170,000	1.20
Springfield, Charles Miller and Sons—whatever that is	164,000	1.00
Springfield, Mill River	96,000	0.75
Springfield, South End Bridge	175,000	1.10

(573) That he heard what Dr. Winslow said about a five percent increase or decrease in the flow of the river; that he does not agree with him from the chemical standpoint; that any addition or any diversion would have an effect from from the chemical standpoint.

(575) "Q. For instance, suppose I take a sample —suppose the river is flowing 10,000 cubic feet per second, and suppose that 100 cubic feet per second is added to the flow and you took a sample before that hundred cubic feet per second was added, and another sample after it was added. Do you think that your analysis of the two samples would in any way indicate the addition of the 100 cubic feet per second to the flow? A. Ten thousand cubic feet per second? That is a large quantity of water.

Q. But you would get a good, fair sample of it from mid-depth, couldn't you? A. Fair.

Q. The way you take it? A. Fair, as we try to do.

Q. All right, now let's add 100 cubic feet per second to the flow of the river, and you take the sample at the same place in the same way, after the 100 cubic feet are added, cubic feet per second are added?

MR. HOLDEN. I suppose the witness is to assume that the 100 cubic feet that is added is the same kind of water which is already flowing through, is it?

MR. AVERILL. No.

MR. HOLDEN. Or is it?

MR. WARREN. It is nice, pure water.

MR. AVERILL. Better water?

MR. WARREN. Better water.

A. It would be very difficult for me to say offhand without having some figures or calculations, whether you would be able to figure that. I know that that 100 cubic feet per second of water has a definite amount of oxygen, and if I add that definite amount of oxygen I know that I add so many pounds which can take care of the sewage of such a population, which is about, say, 35,000 people. If I added water I know I can take care of 35,000 people more. If I substracted, I know that I can take less by that number of people. Now if I have a flow in the river at a certain time of the year, when I need all of the water for dilution, and I took that out, then I know that I can't treat the sewage of so many people less, 35,000 people. On the other hand, if I need that water and I get it, that with any addition, my conditions in the river must necessarily change, in proportion to the amount of water I get,—betterment, so I can treat the sewage of more people with every cubic foot of water you give me, you can treat more people's sewage, with every quantity you take out you can treat less. And that is a clear-cut picture.

Q. Yes, but what I want to know is whether you can tell by your chemical analysis how much water has been taken out or how much has been added? Of course I know you can, at a certain point, but what is that point at which you can determine that? A. I don't see the question clear.

Q. Well, let me try to make it clear. Assume, again 10,000 cubic feet per second flowing in a river, say the Connecticut River, and the 100 cubic foot per second is added, and you take the sample before and after the addition of the 100 cubic feet per second, the 100 cubic feet per second being good water. A. With 10,000 cubic feet, per second I think, your chemical methods would be within the experimental error.

Q. So that you cannot tell, or could tell? A. Not with certainty.

Q. You couldn't tell? A. But that doesn't take anything of the effect that you take out water or add water.

Q. Oh, no, of course, I understand that. If you add water there is more water, and if you subtract water there is less water. A. Which means treatment or no treatment.

Q. Yes, but what I want to know is if you can tell in your analysis? Now there must be some point where your analysis would enable you to tell, suppose it was 500 cubic feet per second? A. I think you would be able to tell.

Q. You would be able to tell that? A. Yes, Sir.

Q. Either way? A. Yes, sir.

Q. Added or subtracted? A. Yes, sir.

Q. Well, how about three? A. I think that is about the border line.

Q. That is about the border line? And less than three you probably could not determine it? A. Not with certainty, sir.

(578) referring to figures of dissolved oxygen in the Connecticut River near the mouth of the Hockanum River previously testified to by him:—

Q. These figures indicate that fish could live in the water at Hartford, couldn't they? A. I think they are just above the border line, yes.

Q. Yes and those figures were the dry weather figures? A. Yes, sir."

(581) That assuming that there was an average flow for a summer season of 5,050 cubic feet per second, and 100 cubic feet per second of pure water was added or subtracted, he thinks it could be determined in the result; that the condition of the water at the State line on any particular day is its condition after it has passed over any sludge beds within the State of Massachusetts, on that day; that if a sample of water is taken the effect of the sludge beds in Massachusetts on that particular water has been exerted; that if the velocity of the stream is not sufficient, then the sludge beds will grow; (582) that they are more apt to grow at a time of year when the flow is less; that they are most apt to disintegrate to some extent if the velocity of the water increases materially; that that would be probably in the spring, when there is high water.

ROBERT SPURR WESTON, an expert witness for Massachusetts, testified (729) that he first came into the case in July 1928, and took over the direction of certain studies; that these studies consisted of making as complete chemical and biological and hydraulic records as time and circumstances would permit of the Connecticut River and tributaries, particularly the Chicopee with its sub-tributaries, the Ware and Swift and Quaboag Rivers; that the hydraulic work was done under the direction of Mr. Sears of the Metropolitan District Water Supply Commission and the chemical and bacteriological work was done under the direction of Walter H. Junkins in a laboratory established in Springfield; that (730) the laboratory began making analyses before the first of October 1928; that a number of stations were established, numbered and located as follows:—on the Connecticut River, station No. 15 at the northernmost bridge in Northfield, station No. 6 below Holyoke and above the northernmost sewer discharge from the city of Chicopee into the Connecticut River, station No. 5 at the mouth of the Chicopee River, station No. 3 at the mouth of the Westfield River, station No. 1 at the state line at

Enfield, and station No. 20 at the ferry at Rocky Hill which is approximately 8 miles below the city of Hartford (731) that on the Chicopee River there were two stations, one at Bircham Bend, just between Chicopee at Three Rivers, and on the Swift, Ware and Quaboag Rivers near their mouths, and additional special stations on the Swift River; that in addition to the stations enumerated above a number of special stations were established; (731, 732) that several long term experiments were made at Dividend Bend, which is on the Connecticut River between Rocky Hill and Middletown for the purpose of studying the effect of the oscillating tidal prism; (733) that the analytical work was limited to necessities; that amount of dissolved oxygen and carbon dioxide present in the water was determined in the field, biochemical oxygen demand was determined in the laboratory as well as most of the usual chemical determination and bacteriological samples; (734) that most attention was given to samples collected at the stations on the Connecticut River at Holyoke, the state line, and Rocky Hill; that in order to avoid the errors due to the exclusion of Sunday as a sampling day, a five day sampling schedule was laid out and this schedule was moved along two days each week; (735) that greatest care was taken to check the work and insure the precision of the method that in addition to the regular determinations enumerated above, special studies were made of the sources of industrial pollution on the Chicopee, Ware, and Swift rivers and in one instance on the Quaboag; that these studies were made to obtain an idea of the contributions of pollution by the various manufacturing establishments above the mouth of the Chicopee River; that they usually consisted of twenty-four hour tests being made mostly during the winters of 1928 and 1929, and in several cases were repeated; that in general these tests consisted of as accurate a determination as practicable of the flow of the river above and below each plant for a period of twenty-four hours and the collection of samples above and below the same plant for the determination of the chemical and bio-chemical character of the industrial waste; that in this way it was possible to

determine the specific amount of pollution contributed on the day of the test expressed in pounds of constituents discharged by the plant being tested; (736) that early in the work Dr. Tierault of the United States Public Health Service who has made special studies of the methods of determining the biochemical oxygen demand and dissolved oxygen of streams, was employed for a few days to check up all our methods in this regard to see whether or not they were in accordance with the best work in the best laboratories; that the 5-day schedule referred to above was adhered to in 1928 up to the close of navigation which was the 17th of December; that after that a boat could not be used, so the winter season catch samples were taken at the stations either from the shore or in some instances from the center of the river through the ice; that in lieu of the sampling at the state line, samples were taken from the canal which leads from the Enfield Dam through Windsor Locks; that the sample schedule in the winter was reduced since the flows were high (737) and the difficulty was much greater; that samples were taken from the canal as described above once or twice a week; (738) that the schedule started with some determinations about the 17th of September and all determinations were made before the first of October, and continued until the river froze; that they were resumed after the ice moved out of the river and carried on until November 1929; (739) that the practice in taking the samples at the state line was to start in the morning with the boat from Springfield and go to the state line, arriving there between 8 and 9 o'clock in the morning; that a sample would be taken at mid-depth near the easterly shore, midway between the easterly shore and the center, at the center, and at the westerly shore; that this operation would be repeated in two hours, usually after a third two hours, and sometimes after a fourth two hours, so that not only was the cross section of the river covered at three places but also three different times in the day; that this was done in order to avoid any errors in sampling due to catching just one sample at one place at one time; that the amount of dissolved oxygen and carbon dioxide gases

in each portion collected was determined on the boat, then the three or four portions, as might be the case, collected from the easterly shore were mixed, three portions from the center were mixed and the three portions from the westerly shore mixed to form (740) 3 chemical samples which were brought to the laboratory for analysis so that for each sample there was made 6, 9, or 12 dissolved oxygen determinations depending upon the number of portions making up the chemical samples, and three complete chemical analyses; (1387) that over four thousand samples were taken out of the Connecticut River, most of the time at ten stations and a few samples taken at five other stations; that the period covered was from September 1928 until the present time, and while the river is still being sampled, the period taken into account in the statistics used in the preparation of this case was a 14-months period beginning with October 1928, (1388) a period of 14 consecutive months; that this was a good period for observation as the stream flow conditions were favorable for determining what might be called, the average condition—the fairly full flood stage condition, and the dry weather condition; that the period, August, September and October, 1929, was one when the flow in the stream was 0.53 of a second foot per square mile and in a series of 17 years, one would find in that period about one year out of five when three drier months would occur, and four years out of five when three wetter months would occur; that is to say, the three driest months in the year would be wetter than the three months of observation; namely, August, September and October, 1929; that the average flow for the whole period of 14 months was just a little less than the mean flow of the river, which is 1.77 of a second foot per square mile; that conditions were normal during October, November and December 1928, followed by a transition month of January, then three wet months again followed by a transition stage, followed in turn by three dry months, and then the month of November when conditions were wetter than they were in October (1389); that the period of observation included three months when the river was way below normal flow and a

shorter period when the flow was considerably below the average for the three months of the examination of the river, and during such time as it was very low, the principal effect was that it showed ample dissolved oxygen in the river to take care of the pollution which now exists, and some margin for future pollution; that pollution becomes more marked as the supply of water decreases, and the pollution decreases as the supply of water increases; that pollution is of importance and enters into the sanitary standpoint only so far as bathing, drinking, nuisance from odors and its effect on fish life are concerned; (1390) that dissolved oxygen is the oxygen which water will dissolve from the air by exposure of the surface of the water to the air; that it is the amount of oxygen available in water which can attack, and break down sewage and industrial waste; that bio-chemical oxygen demand is the requirement of oxygen that sewage and industrial waste present in the water make, and may be as the measure of pollution in terms of the amount of oxygen required to oxidize pollution; that oxygen balance is the amount of dissolved oxygen left after the bio-chemical oxygen demand is made and satisfied; that parts per million means a part of anything in a million parts of water, and pounds per million means the pounds of oxygen to a million pounds of water; (1391) that population capacity means the capacity which a stream has of oxidizing the pollution produced by population in terms of the number of population, for example, the population capacity of 1,000 means the ability of the stream to care for the sewage produced by 1,000 people or the industrial waste equivalent to 1,000 people and (1392) includes not only the sewage of humans but also the industrial population equivalent; that the result of the analysis of water with reference to dissolved oxygen shows that except on a few occasions (a few individual samples) the water was more than 50% saturation, with always enough oxygen at all of the stations, including the state line, to take care of the pollution of the river at that point, and leave considerable population capacity to spare; that this was true of all stations on the river including the low stages, basing the statement on

monthly averages obtained during a series of 14 months; that the condition of the water with reference to the dissolved oxygen is at the state line, the net result of pollution and natural purification after all elements, such as sludge beds, sewage and industrial waste have exerted their force; that were it not for sludge beds, sewage and industrial waste, (1393) the amount of dissolved oxygen at the state line would be considerably higher; that at no time during the examination was the supply of dissolved oxygen insufficient to meet the requirements; that judging from Dr. Winslow's testimony of his observation of the stream, there is an increase in dissolved oxygen between the state line and a point above Hartford; that he had made no observations at Hartford on this point; that between the state line and Rocky Hill, which is the Massachusetts station next below Hartford, there is an increase in the supply of oxygen; that that station was at a point considerably below which the sewage of Hartford empties; that the supply of dissolved oxygen is greater at that point even though the Hartford sewage has been turned into the river, because of the re-aeration of the stream between the two points, or the stretch between the state line and Rocky Hill; that just below the state line the river runs over a considerable rapid so that there is (1394) a long stretch where the contact between the water and the air is considerable, and the flow is more moderate than in the upper river affording ample opportunity for re-aeration, so that by the time the water reaches Rocky Hill the capacity for caring for sewage is increased rather than decreased notwithstanding the addition of sewage from Hartford and other towns in Connecticut; that (1395) considerable bio-chemical oxygen demand arises just below Hartford as a result of the sewage, but in spite of this, the dissolved oxygen at that point is greater than at the state line; that Rocky Hill is about 11 miles below Hartford; that he knows and understands that the average diversion of the water of the Connecticut River by the Ware-Swift enterprise under the War Department restrictions would be (1396) about 2%, and assuming that the diversion were made during the fourteen

months of sampling there would have been a variation from 1/10th to 2 or 3/10ths parts per million either way, in dissolved oxygen or practically insignificant; that translated into percentage, when the water contains 10 parts per million, it might be plus or minus 1% as an average; that the effect of the proposed release of water from the Swift River upon the Connecticut River as to the amount of dissolved oxygen, would be so very slight that it could not be detected at such time as the water is being diverted from the Connecticut River, and there will not be any appreciable effect on the supply of dissolved oxygen; that regarding Professor Winslow's testimony, that it would not be possible to detect a diversion within 5% (1397), the witness thinks that it would not be practicable to do it but if there were available an unlimited research force, and the stream could be controlled, that figure (the 5%) might be reduced somewhat; that he does not believe that the addition or subtraction of 5% of the flow of the river would make any material difference; that he would not like to increase the diversion too much above 5%, certainly anything below 5% would be a safe diversion; that the witness does not believe that a diversion of 2% could be detected, and would have no material effect on the river, no advantage or disadvantage; (1398) that sludge beds which form near the mouth of all sewage outlets and during periods of low velocity, and which are washed away during floods, have the effect during periods of low flow of removing from the river certain materials which would ordinarily be carried down the river and rob the water of its oxygen in the lower portions of the stream, reserving the use of oxygen until such times of high water when the sludge can be carried down stream and use up the oxygen without any harm; that in general a formation of sludge beds in pools like that above the Enfield Dam in dry weather, is an advantage to the stream because it delays the presentation of pollution down in Connecticut where if present it would rob the Connecticut portion of the river of its oxygen more rapidly than if the sludge had not settled out in the river; that in considering his answer that the diver-

sion under the two Acts as modified by the War Department, he considered the fact that there were sludge beds in the river; that the table showing the effect of diversion on dissolved oxygen at (1399) the state line for the months of October, November and December, 1928 and for the months of January to November inclusive, of 1929, (Ex. D-8) shows that in (1400) the month of October 1928 there would be 9.1 parts per million before diversion and 9.0 after diversion; in other words, a reduction as the result of the Massachusetts diversion of 1/10th parts per million; that in November 1928 there would have been an increase in the dissolved oxygen because the dissolved oxygen in the water released from the Swift-Ware Rivers was more concentrated than in the Connecticut River water; that December shows a decrease of 1/10th and January and February 1929 an increase of 1/10th; that the conclusion from this table is that the effects of the diversion are away inside of our powers to detect oxygen in water; that (1401) it is possible to detect changes in dissolved oxygen of 3/10th of a part per million plus or minus; that in the future, if the population above the Connecticut line doubles, the bio-chemical oxygen demand will also double, but the oxygen balance will decrease by not quite 50%; that the reason for this is, that the more the oxygen balance decreases the more the factor of re-aeration comes into effect; (1402) that if the water was saturated with oxygen and carrying a certain amount of pollution and the pollution was increased by one-half, the effect on the stream would be greater than if the water was already polluted and the pollution was increased by one-half, just as a sponge that is partially dry absorbs more water than one full of water, so the river partially depleted in oxygen absorbs oxygen from the air more rapidly; that this is the reason that there is not the same proportional effect of pollution if an already polluted river is polluted, than if a river in the state of nature were polluted; that in other words, the more polluted a stream is, the faster it will absorb new dissolved oxygen by aeration, the more rapidly it will recover; that "nature comes to the rescue more

potently when a stream is depleted"; (1403) that the additional absorption of dissolved oxygen in the Connecticut River keeps pace pretty well with the increased population, and below the state line more than keeps pace; (1403) that the increase of population can be offset as to its sewage and industrial waste by treating the sewage; that from his experience that is a way of utilizing the stream; that in his opinion, with reference to the probable effect of the increased population above the Connecticut-Massachusetts state line, on the pollution of the Connecticut River in the future, if pollution be increased rapidly and be unrestricted, the river will suffer, but it is possible to keep the river not only in as good condition as it is now but to improve it considerably by sewage treatment, and by certain types of sewage purification, that is, the best types; that it would be possible to give it more carrying capacity in the summer than it now has, by as much as 100 percent; (1404, 1405) that referring again to the table Exhibit D-8, in calculating the effect of the addition to or diversion from the Connecticut River the quality of the water in the Swift and Ware Rivers used, was on the basis of their existing condition, and that the fact that as this water goes down the Chicopee River, it will become heavily polluted, was taken into consideration; that (1405) there is another effect; that the Chicopee River consists of a series of ponds and ripples, and the re-aeration effect in the Chicopee is considerably more than in the Connecticut on that account; (1406) that the witness has read over the testimony of Dr. Winslow and Dr. Rudolfs, and has obtained considerably higher results than did Dr. Rudolfs at the state line; that his results are based on the monthly averages, but even for the periods for which they got results like the period from November 1st to 11th, his dissolved oxygen results were considerably higher; but that in general he finds some agreement (1407) that he took more observations than they (the Conn. Engineers) did at the same point; that he took either 6, 9, or 12, observations a day but did not make any 24 hour tests; that he agrees with Dr. Winslow that the river is in good condition at the

present time but he does not agree with Dr. Winslow that the river is in a condition to be "tipped over" by a small depletion of oxygen; that the few occasions when the dissolved oxygen was less than 50% were not at the state line; that he cannot say that sludge beds are a benefit but that if sewage is being discharged into a slow stream, it is a benefit to have the sludge kept near the sewer outlet and not be carried to the lower stream; (1408) that while all the sludge beds have an oxygen demand, they use up the oxygen more slowly when they are on the bottom of the stream than if they are suspended in the water; that the actual condition is that there are sludge beds in the stream; that they have an oxygen demand, which has to be supplied from the water; that anything that goes out of the sewer has to be supplied with oxygen from the water to be purified; that when the stream flow is higher some of the sludge beds go down stream where the water is more able to take care of them; that the sludge beds in depositing on the bottom in the summer months and staying there, are possibly of little benefit in retarding the possible amount of demand which might be created lower down; that the fact that some of the sludge beds are taken away by the higher flow, does not hurt, because at that time there is plenty of water to supply the demand; (1410) that referring to Exhibit D-9, the figure 9930 in the first column (1411) represents the flow of the Connecticut River in Connecticut at the Enfield Dam in cubic feet per second during the month of October 1928; and that next figure on the same line, 6418 represents the same quantity expressed in million gallons a day, and that the figure in the third column 1.02 represents the same discharge expressed in terms of cubic feet per second per square mile of catchment area above the dam, and in the 4th, the same discharge is expressed in terms of million gallons daily per square mile of catchment area; that (1412) the mean annual discharge at the Enfield Dam is 17,000 cubic feet per second (the term "second feet" is synonymous with cubic feet per second); that the purpose of this table is to show the hydraulic conditions under which

the observations, which the witness has been testifying to, were taken; (1414) that the lowest amount of dissolved oxygen found by the witness in the Connecticut River was at station No. 1 (at the state line) on September 8th; that at this time the dissolved oxygen had a value of 3.75 parts per million which is equivalent to 44% saturation; that the average for the period of September 5th to September 13th inclusive, was 4.70 parts per million which is 53% saturation; that the Swift River at the present time averages 92% saturation; that the Ware River at the point where the taking is to be made, he would expect to have about the same per cent saturation; that on September 8th referred to above, water would have been released from the Swift River Reservoir and no water would have been diverted from the Ware River; that the figures (1415) on Ex. D-9 in each of the columns represent monthly averages.

EARL B. PHELPS, an expert witness for Massachusetts, testified (1482) that the population capacity of the stream is its oxygen balance expressed in terms of population; that Dr. Rudolfs has told how it is possible to evaluate the sewage and other wastes of a given population in terms of oxygen and he has made use of that principle to express his industrial wastes in terms of equivalent population; that it is found convenient to carry this process one stage further and to express the oxygen equivalents determined by analysis of the waters likewise in terms of population; that since populations primarily are being dealt with this gives a unit for comparison which is much more intelligible than the ordinary analytical expressions, that population capacity of the stream, therefore, is its ability to provide for the wastes of a given population during the time of passage to saltwater and under the temperature conditions existing at that stream; that it represents in brief the reserve capacity of the stream to care for additional pollution over and above that which it now contains and to carry that pollution to the sea without the production of a resulting nuisance, (1483)

that when the Dr. Winslow says the ability of a stream to take care of sewage and industrial wastes he means the ability of the net balance of dissolved oxygen over and above everything that is in the stream or that has happened to the stream by way of pollution in the past; that the net balance from time of sampling to the sea is the basis for population capacity; (1484) that the net balance of which he speaks is what has been referred to in the case as oxygen balance; referring to Exhibit D-14,—

Q. "Supposing we start with October, 1928, and run that right across as typical of the other months. The first figure under column 1 is 3,887,000. What does that mean? A. That is the population capacity, as I have defined it, of the Connecticut River at the state line.

Q. During the month of October, 1928? A. During the month of October; yes, sir.

Q. The next column is 59,000 with a minus sign in front of it. What is that? A. That is the population capacity of the water of the Swift River which would have been diverted during the month of October, 1928, under the Massachusetts legislation and the War Department restrictions.

Q. And the minus sign means that it would reduce the population capacity of the Connecticut River at the state line by that many thousand people; is that right? A. Yes."

(1485) Q. "That again is for the month of October, 1928? A. Yes.

Q. The third column is simply a subtraction of the second from the first, isn't it? A. Yes.

Q. So that after the Swift and Ware River diversions, such as they may be, during that month, the remaining population capacity at the state line is the figure, 3,828,000? A. Yes.

Q. What is your fourth column, "Percent change?" A. That is merely the value of column 2 divided by column 1. It represents the diversion in terms of population capacity and as a percentage of the total population capacity of the river at the state line.

Q. So that the population capacity at the state line is reduced by the diversions, 1.5 percent during that month? A. Yes, sir.

Q. Your last column, again for October, 1928, 1.3; what does that mean? A. That is a similar term that refers to the actual volumetric flow of water. That is, it states that 1.3 percent of the total volume of water passing the state line during that month would have been diverted.

Q. Skipping down to August, 1929, your first column is 368,000? A. Yes.

Q. That, of course, means that at the state line during the month the population capacity of the river was that many people? A. Yes.

Q. Your next column is the first one that has a plus sign before it. It says plus 5,000. What does that mean? A. That signifies that under the War Department regulations there would have been a release of water from the Swift during that month, and the excess of release over the normal flow of the river for that month is equivalent to 5,000 population. (1486)

Q. That, of course, adds that number to your third column? A. Yes.

Q. And your fourth column shows an increase in percentage of population capacity? A. Yes.

Q. And the fifth column shows that instead of being a diversion there was an addition of nine-tenths of one percent; is that right? A. Yes;"

That the table, Exhibit D-15, summarizes the results of analytical determinations of the various oxygen quantities involved at the sampling stations at the state line and at Rocky Hill, which is about 10 miles below Hartford; that the first column shows the population capacity of the Connecticut River at the state line, month by month; that the second column shows the population capacity of the Connecticut River at Rocky Hill during each of the same months; (1490) that the fact that the population capacity at Rocky Hill, as shown on Exhibit D-15, is so much greater than the population capacity at the state line is due to several factors, chiefly to re-aeration; that the population capacity is based upon oxygen balance, and the oxygen balance, in turn, is determined by two factors, one, which corresponds to the cash on hand in a bank statement, is the asset value, the oxygen present; and the other,

which corresponds to notes not yet due in the statement, is the demand; that the oxygen balance is the balance of the statement, and as re-aeration, which is income increases the cash reserves, the population capacity is increased in proportion; (1491) that there are some other considerations that enter that; that the somewhat nearer distance to salt water makes the value of a pound of oxygen somewhat greater, that is, a pound of oxygen from Rocky Hill must needs carry the sewage for less time, a shorter time, than a pound of oxygen from the State line, so that pound for pound the resources at Rocky Hill are somewhat more valuable; that, completing the financial parallel, it is as if a merger with a larger solvent concern were in prospect at a certain date; that notes extending beyond that date would not be presented therefore and conditions in insolvency might be prevented by the merger taking place before the notes came due; that this demand is a continuing thing and it is exerted over a lapse of time and, briefly, then if the water reaches the ocean—the salt ocean—before all the notes are presented, there is no further danger of oxygen insolvency; that, to put it perhaps in its simplest terms, the two columns in Table 6 show the proportion of improvement in the water between the state line and Rocky Hill; (1492) that the table simply shows that the population capacity at Rocky Hill below the point where the Hartford sewage is discharged into the river is greater than it was at the state line, and the figures show how much greater; that Exhibit D-14 indicates an improvement so far as it goes in the population capacity of the Connecticut River at the State line during the month of August, September and October of 1929, due to the release of water from the Swift River; (1493) that it is almost nothing as many of these figures are; but that the indication from the computations is an improvement in the river;

> "Q. Now, Professor Phelps, I am going to read to you certain testimony given by Dr. Winslow. It seems to me that this is the shortest and simplest way to summarize your testimony, if you will follow this testimony that I

will read from the record. On page 514 of the record the following questions and answers were asked on direct examination of Dr. Winslow:

'Q. Now, you are acquainted in a general way with the Massachusetts legislation as to the abstraction of water authorized under that legislation of Massachusetts? A. In a general way, yes, sir.

'Q. You are acquainted with the restrictions imposed by the War Department? A. Yes, sir.

'Q. How much effect would the restrictions imposed by the War Department have upon the Connecticut River at the State line, assuming they are complied with? A. I don't think that the change would be sufficient one way or the other during the summer months to be detected by any methods at our disposal, either way.'

"Do you agree with that conclusion so far. A. Yes. Q. "Reading):

'Q. It doesn't make any difference whether it is the Massachusetts legislation or the restrictions of the War Department? A. Just look at it from a broad—let me try to look at it not as an expert, but from a broad common sense standpoint at the beginning. Say you are putting in or taking out something well under 5 per cent. Now, then, none of these methods we are using on the river would check on samples taken half an hour apart within 5 per cent. In other words, I cannot conceive that the effect of these differences and the change in the condition at the State line could be detected by any means we now pursue.

'Mr. Warren. What do you mean?

'The Witness. I mean if you take out 5 per cent of the water in the Connecticut River or 5 per cent of the oxygen, or if you put it in, put in 5 per cent more or take it out of that now reaching the State line, if you could take the river just above the State line and had a magnet and could pick out 5 per cent of the oxygen or put in 5 per cent more of oxygen, nobody would be able to tell the difference. If the experts on both sides of this case were there before and

afterwards, I doubt if they would be able to obtain results that would show a difference."

(1494) "Do you agree with that? A. Yes.

"Q. This is a continuation of the same answer:

'If you take out 10 percent, I am inclined to think you could probably find a damage or a benefit, depending on whether you are putting it in or taking it out. Then if you got 20 per cent, I am rather sure you would have a rather definite and appreciable and serious result if you diverted out of this flow.'

(1495) "Do you agree to that? A. Well, I am not sure about the serious result. I haven't investigated that. But, in general, I agree with Professor Winslow, that that might be about the line that would be noticeable."

"Q. Now, skipping somewhat here, because it is simply apparent an example, he then goes on and says this:

'We can say that every quart we take out makes it worse or every quart we put in makes it better, but within the limits we can use in analyzing you would have to have 10 per cent change, let us say, one way or the other before you could get anything that would really be significant.

Q. So that so far as the actual condition of the water is concerned it isn't going to be materially affected one way or the other? A. I don't think so.

Q. It can't be any better and you don't think it would be any worse? A. I don't think either diversion under the War Department ruling or diversion under the Massachusetts statute, as I understand it, would make any detectable difference in the water at the State line.

Q. At present? A. At present.'

"Do you agree with that statement that I just read? A. Yes, yes, I do.

"Q. Now, on the following page appears this question?

'So that if the compensation from the diversion of the Ware and Swift Rivers amounted to 10 per cent in your oxygen in spite of the amount which is authorized to be released under the War Department's restric-

tion, you would have a substantial benefit instead of a situation which does not change the present situation? A. (1496) I think anything that added 10 per cent to the pure water in the Connecticut River would benefit it appreciably.'

"Do you agree to that? A. I wouldn't think it was a very material benefit, no, in view of these showings. That is just about the limit of analytical determination. I think his general conclusion here is safe.

(1497) "Q. Going on to page 520, Mr. Warren, on cross-examination, asked these questions (reading):

'Q. Supposing that the flow of the Swift River during that period was 1.3 per cent of the Connecticut's flow at the state line, would that amount fall within the quantities which you described as neglible and non-detectable? A. I think it would, sir, yes.'

"Do you agree with that? A. Yes, fully.

"Q. (Reading):

'Q. And, as I understood you, neither you nor the experts on our side would be able to determine with any satisfaction to themselves or to yourself, what the effect of that was, that addition or subtraction? A. Assuming it to be 1.3 percent of the total flow of the river?

'Q. Of the total flow of the river. A. Yes; I think that is true.'

"You have indicated that you agreed with that? A. Yes.

"Q. (Reading):

'Q. As I understood you, that would be true probably up to a contribution or a diversion of about 5 percent? A. I should say somewhere around there, yes.

'Q. And after 5 percent it would become detectable and at 10 percent I think you stated it would be detectable? A. Yes.'

"That as to those percentages he cannot agree with Professor Winslow about the matter of detecting

the changes; (1498) that he doubts whether even a 20 percent subtraction would make a serious condition under the present existing conditions, because of the great improvement of the river shown by my figures, between the state line and the Rocky Hill Station.

That as to the five percent conclusion of Professor Winslow he is heartily in accord and thinks he is quite right; that five percent is below the limits of our analytical work; carefully analyzed all his data as to their probable accuracy, including errors of sampling which, of course, are large; that one is dealing with a chance sample here, taking a bottle out of a great river; that he had to allow for errors of sampling, the error of time of sampling, the hour of taking the sample, and the errors of location of samples, both as across the river and up and down, and all those things, plus his laboratory accuracy, which led him to believe that about 10 percent is about the degree of accuracy of the work on these monthly statements; that carried through a year, perhaps a little better than 10 percent would be possible; that anything beneath 10 per cent is certainly not significant; that one is limited to the accuracy of our measurements.

"Q. I will read you a few more questions and answers, and I think we will then probably conclude (reading):

'Q. Would you say that that same conclusion was true as regards the public health? A. Well, yes, I should because you would have to have an enormous change in quality on the one hand and an enormous improvement to make the river safe for bathing. (1499) You would have to have a very large change for the worse to make it impossible to purify it by storage, chlorination or filtration. I should say, then, that a change of five percent either way was not of practical moment.'

"You agree with that? Yes, quite fully.

(1500) 'Q. Either as regards the purity of the water or the effect of the water with respect to public health? A. Yes, sir.'

"And that meets your approval? A. Yes.

"Now, follow this, Professor Phelps, a question by Mr. Warren on page 253:

'If there would be any determinable difference, how much difference do you think there would be in the cost of purifying the Connecticut River at Hartford, in the way you have suggested, by storage, filtration and chlorination, before and after this Ware and Swift River diversion? A. I have tried to indicate that the difference due to the abstraction of one per cent or two per cent of water is so slight that it cannot be measured in any concrete way. It is a purely theoretical damage or advantage when we are within those limits.

'Q. For any purpose? A. For any purpose that I know of we cannot determine within one or two per cent.

'Mr. Averill. You are speaking now of public health?

'The Witness. Yes, particularly of the cost of building a purification plant.

'Q. You have already said it did not make any technical difference in regard to public health? A. Yes.'

"Now, you agree to that? A. Yes, I do, quite fully.

"Q. Then Dr. Winslow went on and said that with reference to navigation and states that he was not competent to state. (1501) Now, assuming, Professor Phelps, that the population of Massachusetts above the State line grows in the next few years or in the future, what effect would that have on the population capacity of the Connecticut River at the State line? A. It will reduce the population capacity almost exactly in accordance with the amount of growth.

"Q. Now, is that same thing true as to the effect of an increase of population at a point above Hartford? A. Yes.

"Q. So that as the population doubles, for example, is it true in your opinion that the population capacity will be cut in half? A. No.

"Q. The same proportion. A. No, that is not the way it works.

"Q. How does it work? A. If we add 100,000 population, we subtract 100,000 from the population capacity. We have a population in the Springfield region of something like 350,000. Now we have a population capacity there in October of nearly 4 million. Now, if the population grows to 450,000 we would merely subtract 100,000 from that 4 million.

"Q. So that it simply lessens the population capacity by the number of people. A. Yes, exactly.

"Q. Representing the increase in population. A. That is at the nearby points. Now exactly 100,000 at Springfield would reduce the population capacity below Hartford by even less than 100,000.

"Q. And why is that? A. That is because with the greater draft upon the stream the force of re-aeration is more active. As the oxygen tends to be depleted, it is as if a vacuum were produced in the river, and Nature, abhorring a vacuum, attempts to fill it up. (1502) There is an oxygen pressure in the air alway pressing into the water, and as the pressure in the water is released the oxygenation is faster. So that the detriment, the lowering of oxygen in the stream never keeps pace with the increased demands. It always lags.

"Q. Have you figured out in any way a rough percentage as to the amount of decrease in population capacity, as compared to an increase in population above the State line? A. I was interested in Dr. Rudolf's estimate of future conditions, in which he thought that the population, including industrial wastes, might be doubled by a certain year. It is immaterial, of course, what year they may occur in. That is, that is out of the province of a chemist. But you can compute the effect of a double population. And if I may modify your question, I would assume that double population all the way down including the Connecticut population as well as the Massachusetts, and I find that the effect of doubling the population on the whole river above Rocky Hill would result in a 32 per cent change in the capacity at Rocky Hill. That is a 32 per cent decrease would follow a doubled population.

"Q. That is a 100 per cent increase in population? A. Yes, would result in a 32 per cent decrease in the actual oxygen present at Rocky Hill. That is the measure of nuisance.

"Q. And the reason for that is, as the river or as water becomes more saturated with sewage and wastes, that it much more rapidly absorbs oxygen. A. Yes. That is it, exactly."

(1503-1507) that figures of yearly averages on exhibit D-14 have no significance nor application; that the figures shown in the several months are monthly averages.

(1508) "Q. In order to clean this up, take your first month, October, 1928. To what extent exactly does the average day during that month come into the picture in making your computation? A. During any one month when the temperature and flow conditions are not varying greatly, it is proper to take all the things—figures that you have for the month—and average them up for the purpose of presenting a summary statement. It would not only be very cumbersome to put in the daily figures, but they wouldn't be so accurate. Our figures gain in accuracy as the average numbers of the determination. Any single determination during that month would not be as fair a representation of the month as this monthly average is.

"Q. And that average for October is just for that one month, is it not? A. Yes, that is the summary of all analytical data on the stream flow that we have for that month averaged together, and it shows better than any one figure for that month. We cannot use that for the whole year. It would not be fair to take this last average column for the whole conditions for the year, except with due consideration of what it means. It does represent the conditions for the whole year, but it cannot be taken, however, and said to represent the conditions for any one month. A month is short enough time so that averaged it is a fairly accurate story? A. Yes.

"Q. That is the answer, isn't it? A. Yes, I think perhaps if we wanted a statement of the yearly conditions the total line is better than the average line, although they are both of the same nature.

"Mr. Callahan. I think that is all. (1509)

"Mr. Holden. I want to ask him a question.

"Q. (By Mr. Holden) Did your estimate of ten per cent on the subject of accuracy—you recall that? A. Yes, yes.

"Q. Did your estimate of ten per cent on the subject of accuracy refer to one sample or to an average number of samples? A. This referred to monthly averages. We were taking something like twenty samples or twenty-five samples in the month and each sample—what we call a sample—would contain six actual bottles taken at three points on the river and at two different hours. Sometimes nine samples, nine bottles, would make up a sample. It is more than a simple dipping of one bottle into the river. Sometimes we take at three stations across the river, east, west and center, and for the most part at important stations that were taken over three hours.

"Q. But the point is you claim to be within ten per cent of accurate on an average number of samples? A. For the month, yes.

"Mr. Holden. I think that is all.

"Mr. Callahan. That is all. No further questions."

GEORGE W. FULLER, an expert witness called by Massachusetts, testified as follows: (2159)

Q. Mr. Fuller, did you hear the Winslow and Phelps testimony about the effect of diversion from the Ware and Swift upon pollution of the Connecticut River, or read them. A. Well, I heard Professor Phelps and I read Professor Winslow's testimony.

Q. And do you agree with their testimony? A. Yes, in so far as the proposed diversion will not effect any measurable influence on the quality of the water of the Connecticut River at the State line, and it is also my view that Professor Winslow made a very clear and very fair statement as to what the limitations are as to the methods of measurement of that pollution. I am very glad to affirm what Professor Winslow said in his summarizing statements and those matters which were read, I think, to Professor Phelps by Mr. Callahan.

GENERAL SANFORD H. WADHAMS, a witness for Connecticut, testified (980) that he is at present the Director of the Connecticut State Water Commission, and a member of the Commission; that it is one of the state agencies that came into existence in 1925 created to meet the demand that something be done to control the growing evil of pollution of the waterways of the State of Connecticut; that the Act was Chapter 143 of the Public Acts of 1925, entitled "An Act Concerning the Pollution of Water and creating a State Water Commission;" that he graduated in medicine from Yale University; that he was given the degrees of Bachelor of Philosophy, Doctor of Medicine and the honorary degree of Master of Arts; that he spent twenty-five years in the medical department of the army where he was more or less concerned with problems of sanitation; that he retired from the army following the World War with the rank of Colonel and was promoted to the rank of Brigadier-General on the reserve list; (982) that under the law the Commission is charged with the elimination, in so far as is possible, of the pollution of the waterways of the state; that the authority given the Commission is very broad; that in the Commission is vested the power to issue order to individuals, corporations or municipalities, to correct any pollution for which they may be responsible; that it places in a rather separate category new sources of pollution which come into existence after the passage of the Act, in fact, it absolutely prohibits anything of that kind; that one might think that that duplicates the functions of the State Department of Health, but that is not the case; that the State Department of Health has ample authority in law to take necessary action where the pollution of a waterway in any way menaces the public health; that the State Water Commission is concerned only with the economic aspects of the problem; that the reason for the Commission's existence is that already prior to the time it was created, industry was becoming hampered for the want of the necessary water of the proper quality and sufficient quantity; that in other words, the economic development of the State of Connecticut was approaching the

saturation point because, of course, it is a fact that industry is absolutely dependent upon the water necessary for its purposes, (983) that practically every industry requires water for the generation of power, or steam, or both, but more important for the process water; that almost all of the industries of Connecticut require large volumes of water suitable for the manufacturing process which each particular industry carries on; that that is more true perhaps of the textiles and paper making, where water of high quality is required; that those industries are more generally located in this state in the eastern end; that the metallurgical industries also use large quantities of water, but require water of less high quality; that as industry in this state has developed it naturally follows that population increases and the population curve shows a steady year by year rise; that the result is that the demands for potable or domestic water supply are constantly growing, so much so, that all over the state of Connecticut practically every city of any size in the state is at the present time reaching out in an effort to develop additional sources of water, and that was one of the reasons for the creation of a Commission, to have some authority over the water resources of the state and to act in an advisory capacity at least as to the allocation of these water resources, because it is now found that municipalities and communities are in competition, and also to meet the situation which will come at a time which is very close, when all of the available clean water sources of the state are developed; that in fact, that time is placed (984) by the engineers as almost here at present; that when economic refers primarily to the necessity of supplying industry with its growing needs for an industrial water supply and the growing population with its need for domestic supply; that the Commission, in its original survey of its problem, found that the domestic sewage of the communities of the State of Connecticut accounted for approximately 85 per cent of the total volume of pollution reaching the waterways; that the Commission has therefore stressed that side of its work; that it is not meant to convey that it had not done a great deal to correct pollution

from industrial waste, but, because of the volume of the domestic sewage and because of the fact that it is a problem that affects every member of the community, it has emphasized that part of its work, and its policy has been to take up, through hearings with the officials of the Communities of the State, wherever pollution is taking place, the necessity of formulating a program for treating that sewage before it is discharged into the waterways of the state; that there has been a considerable degree of success accompanying that effort; that it may be said almost without reservation that every community of (985) any considerable size in the State of Connecticut at the present time is engaged in some stage of the process, varying from the initial stage, which is an engineering survey to show what should be done, up to the point of actual construction of sewage treatment works; that one need go no further than Hartford, where recently, acting on the report of Mr. Eddy, of Metcalf & Eddy of Boston, the city has adopted a program which commits it to an expenditure in excess of $3,000,000 to treat its sewage prior to discharge into the Connecticut River; that New Britain's sewage is entirely discharged into the Connecticut River through the Sebethe (Mattabesset) just above Middletown; that New Britain is at the present time engaged on a rather difficult problem, of deciding just what form of treatment should be put in; that Middletown has appropriated money and is now carrying on a survey; that the program of the State Water Commission contemplates that every community now discharging sewage into the river will be required to treat that sewage; that Thompsonville is now taking the first step; that the town of (986) East Hampton on the other side is holding a special town meeting this week to devote money for their first step; that no community has been neglected; that at the very first meeting that the Commission held, it was decided that the State, when it went to a community and required that community to spend a large sum of money towards treating its sewage, should do so with clean hands, and it at once started on a program of installing sewage treatment plants at all state institutions, and he can name at

the present time only one which has not now been supplied, and for that one there are reasons why it has not been possible, from an engineering point of view, up to the present time, but the Commission started with the Middletown State Hospital on the banks of the Connecticut River; that the State owns a large tract of land on the river at Middletown and had, up to two years ago, discharged the sewage of between four and five thousand people in its raw condition into the river; that that institution is the Connecticut Hospital for the Insane; that the State immediately drew up plans for a modern sewage (987) treatment plant, and it was built under the supervision of the State Water Commission, and has been operated since a year ago last Spring; that it has followed that same procedure at various of the other state institutions, Norwich State Hospital, Mansfield Training School, Connecticut Agricultural College, the Niantic State Farm for Women and various others; that the law explicitly forbids the creation of new sources of pollution, and all plans for sewage disposal have to be passed upon by the Commission; that the last session of the legislature passed an act which charged the State Water Commission with making a comprehensive survey of the water resources of the State of Connecticut; (988) that that survey is now being made; that the act further provided that the report shall be submitted to the Governor this year; that the Commission is showing in this report the necessity for the State to make such a comprehensive survey, including stream-gauging, rainfall, water run-off records, and that sort of thing, and suggesting a method for the administration of the proposed act; that this Commission has been very much interested ever since it learned that it was proposed to divert water from the Connecticut River; that it felt that the Commission had a vital interest, because it was not only that Massachusetts proposed to do this, but that other neighboring states were looking toward certain interstate streams with longing eyes, and it was felt that it was, therefore, a matter of very great importance to it under that part of the law which charges it with supervision of study of the water resources and conservation of such

resources to know what was going on; that the conservation of the water resources of the state includes the cleaning up of streams in Connecticut for the purpose of future water supplies (989) that cities and towns as was pointed out, are already reaching a time when all of the available sources of clean water supply are approaching exhaustion; that in the comparatively near future it will be necessary to go to these larger streams,—interstate streams such as the Farmington, Connecticut and Quinebaug Rivers,—as sources of domestic water supply; that in fact, it can't very well be avoided, if the State of Connecticut continues to grow and develop; that it is thought that Hartford will be the first city that will have to consider using the Connecticut River, and has only recently completed a very large addition to its water supply, but, because of the rapid growth, it now finds itself confronted with the necessity of again increasing its water supply, and it is therefore, in competition with other large cities, growing cities on the same watershed, for a water supply which is limited; that Hartford introduced a bill in the last General Assembly asking for rights to another river, but that it was refused because of the fact that other communities on the same watershed protested so vigorously that it was felt that nothing could be done without very careful study and allocation of the available water supply; that there was created also at the last session of the legislature the Metropolitan District of Hartford, which consists of Hartford and five (990) of the adjoining towns, all uniting in the supply of essential public utilities, such as water, and sewage disposal and a few others, such as intercommunicating highways; that that, of course, has made the situation, as far as Hartford is concerned, more acute, because now it has to supply all of the surrounding towns, as well as Hartford, and some of them are growing very rapidly; that this Metropolitan District includes the subjects of sewage disposal and water supply; that Hartford had accepted a program amounting to something over three millions of dollars for treating its sewage; that that happened about the first of November and in that same week Hartford voted on

whether it would come into the Metropolitan District; that the voters decided that they wanted to come in, and at that time the question of providing for sewage disposal, becoming a District question, passed from the hands of the City of Hartford into the District; that the District is now organizing for taking up its problems and will undoubtedly take it up where Hartford laid it down; that the State Water Commission has discussed the problem of sewage disposal with the Chairman of the District Commission who agrees with its point of view, (993) that New Britain gets its water in a general way from the township or the town of Burlington which lies to the west and a little north of Hartford; that New Britain isn't on the Connecticut—it lies inland to the west a few miles; that the source of supply is a reservoir impounding a mountain stream, and from there the water comes to New Britain; that the sewage goes through a sewage disposal plant that cost the city about a million dollars; that this plant is now inoperative because of certain classes of waste that make it impossible to operate it; so it is practically raw sewage that is discharged first into a small creek and then into the Sebethe (Mattabesset) River, and then into the Connecticut River; (994) that the usefulness of the plant cannot be restored economically; that it is a sand filtration plant, and much of the industrial waste which was principally metallurgical and loaded with iron salts, went into the sewers; that those iron salts sealed up completely and effectively the sand filters so that the sewage runs across the top of the beds into the stream; that the plant would have worked if it hadn't been for the metal salts; that it is a recognized method of sewage disposal; that there is no better method than sand filtration; that the State Water Commission is charged with the cleaning up of the waterways of the State; that its duty is to get the sewage and other forms of waste out of the streams so that they can be used for industrial and domestic purposes; that that is its program; that what has been done in the way of handling the domestic sewage problem has been outlined; that as to industrial wastes, the law requires that the manufacturers shall be told how their

particular wastes can be satisfactorily treated; that that is pioneer research work; that for instance, there is no one that knows how kier liquor (995)—where cotton has been boiled for bleaching—can be treated at reasonable cost; that no one knows what the answer to that question is; that the Yale and Wesleyan University laboratories have been employed, and are carrying on studies of various industrial waste problems, that as the answer to a problem is found the manufacturer can be told what the method is that the Commission wishes to put into effect; that it has been urged to set standards of purification for different streams, but that is not found feasible; that there are certain streams that never can be recovered to the point where they can be used for anything except process water, that is, more or less polluted water; that other streams can be brought to the point where by well-known methods of treatment good potable water can be made out of them; that some of them are so far polluted they are hopeless; that perhaps the Naugatuck River is most heavily polluted for the reason that it is the center of the brass industry and the stream is so filled with copper in solution, as well as acids and other metal salts, that to do anything substantial for it in the light of our present knowledge would mean closing up great industries; that the river is a "nuisance" because, in addition to all this metallurgical waste, it is receiving all the sewage of the valley; that the Commission is pushing ahead with its program of removing the untreated sewage and so correcting this nuisance which now exists, that upon the initiation of the State Water Commission, towns on the river are putting in sewage treatment plants, (996) that this will prevent the river appearing and smelling like a sewer; (997) that from the study or survey of the situation in Connecticut as to what is the more pressing need, purifying water for industrial purposes or getting an additional supply of reasonably pure water for domestic purposes, this need would differ in different parts of the state; that in the more densely populated parts, the domestic water supply is the pressing need, but in certain other parts of the state satisfactory process

water is quite an urgent problem; that all of the textile plants were originally located where they are because the quality of water allowed the turning out of their product; that these plants are largely in the eastern section of the state where there are a number of large rivers; that the Quinebaug is an interstate river which joins up with the Willimantic and one other stream to form the Thames River; that in the case of Hartford, the domestic supply is more apt to be its next problem; that were there only water enough for either the domestic requirement of the community, or for the industrial requirement, generally the domestic is considered the greater need (998) as to priority in the use of the water; that it should be strongly emphasized that the recreational need should be placed very high, possibly ahead of navigation needs; that the president of one of the largest industries in the state, speaking befor the Manufacturers Association not so long ago, made the point that his company, which is a subsidiary of General Motors, required that he explain every time he attended a meeting of the board of directors, why his plant was kept off here in New England, so far removed from its (999) source of raw material supply, that the only convincing argument that he was able to advance was that where this concern was now located in Connecticut he had the best skilled labor supply in the whole United States; and that that was enough to offset all the other economic advantages of moving out into the middle West; that that point having been made, he developed it to show that that same skilled labor today required and demanded certain things in the way of living conditions, such as recreation for their leisure; that as to the recreational value of water, from the point of view of parks and bathing beaches and fishing privileges, he said that if Connecticut did not provide these for its people, it would certainly lose its best asset, which was the skilled labor, because they would go where they could find it, that as to whether the Commission would be disposed to put the recreational value of water ahead even of the industrial requirement, it would seem that the two go together, because if there are no industries, there is no need for skilled

industrial labor; that recreational need should follow closely after the industrial need; that the industrial need is put very high, because industries create the constant population increase in the State of Connecticut; that its industries are constantly expanding in spite of the fact that a great deal is heard about their moving to the South, and a great many of them have done so; that there again, one of the important factors is the shortage of suitable water in New England; that the inability of the textile man to find a suitable water supply has driven him down South to get it, where he is not running afoul of pollution commissions, such as the State Water Commission, to add the overhead of industrial waste treatment to the cost of doing business; that (1000) after recreational and industrial requirements which he would put next to domestic supply, he would put the requirements for power and after that those of navigation.

FISH LIFE

MR. ARTHUR H. FRAZER of Cromwell, Connecticut, a witness for the State of Connecticut, testified (960) that he was not employed by the State; that he had made a study of the Connecticut River so far as the shad industry is concerned; that up to January 1, 1930, his business had been that of a fisherman; that from his view as a fisherman he considered that the flood conditions in the spring in the river had an influence on the shad fisher; (961) that he figured a large freshet cleans out the river thereby purifying the water and it leads the shad into the river; that the water shoots down into Long Island Sound and goes out maybe two miles; that the fish coming up the coast hit the fresh water and it leads them into the river; that ordinarily on an ebb tide the fresh water goes perhaps a mile or half a mile into the Sound and under the same conditions, the freshet goes two miles or further.

MR. JOHN W. TITCOMB testified (961) that he has been superintendent of the Connecticut State Board of Fisheries and Game since April 1, 1922; that he is somewhat familiar with the fishing industry on the Connecticut River; (962) that in his opinion the flood waters have very great effect on shad life in the Connecticut River; that the shad run on the high water; that also formerly perch and striped bass did the same thing; that almost all anadromous fish do; that also trout run to spawning grounds during high water; that the state operates two shad hatcheries and a perch hatchery on the Farmington and Salmon Rivers which are tributaries of the Connecticut; that he finds from experience that the waters from the tributaries of the Connecticut River have an influence on the fish life in the river; that they all contribute towards the clear cold water of the river and have something to do (963) in regulating the temperature and a good deal to do with regulating the flow; that he has no doubt that any diversion from

those streams will adversely affect fish life to some extent; that under his administration the state first began to propagate shad; that the catch of shad and the artificial propagation from 1923 to 1929, both inclusive, was as follows (964):

Year	Catch	Fry Released
1923	13,350	609,000
1924	25,316	3,723,000
1925	43,365	3,824,500
1926	37,177	4,514,000
1927	34,321	6,613,000
1928	56,191	14,912,000
1929	91,597	18,833,000

that the last high figure in catch is attributable to artificial propagation; (964) that it takes four years from the time of putting the fish in the stream to get results; that if the flood water is high and the temperature is high early in the season, the shad get in the upper waters, and the upper river fishermen get the best fishing; on the other hand, if the season is late, the lower river fishermen begin to catch them before the upper river fishermen do, and they have got to get by the lower nets to give the upper river people any; that whether they get upstream is dependent on the flood water, that is what attracts them; that a reduction in the flood would be harmful to the fish life; (965) that he could not tell how much of a reduction would affect them but any change in water conditions will; that he had this experience for forty years; that the flood varies from year to year some seven or eight feet; that he doesn't know as he can say that the run of fish varies in direct proportion to the floods but ordinarily the best years of fishing are with the high flood conditions; that generally speaking the records would show that the bigger the flood the bigger the catch but not always because some years there is an adverse weather condition; for example ten days ago there was very hot weather; if that condition had come on early in April, with the high water that always comes with that kind of weather,

from the melting snows, he thinks the shad would have come up the river; then last Sunday's cold snap, would simply turn the fish right back and keep them back so they might not have come in at all; (966) that they might not ever come back up as a result of that, and it might have left them egg-bound, and that means there would not be as good reproduction; that while formerly shad ran up the Connecticut River as far as Bellows Falls, Vermont, they now are confined to the State of Connecticut because of the dam at Enfield; that they cannot get over a dam; that shad will not take a fishway; that it is the only species of the anadromous fish that won't take a fishway; that no fishway has been devised that would allow shad to pass; (967) that the limit of their upstream passage is the first dam they come to; (967) that the percentage of shad would be more or less uniform in proportion to the size of the flood; Q. Would the effect of it be in proportion to the amount of water diverted? A. Probably—that is sort of difficult to answer; (968) that a three inch diversion from a 25-foot flood wouldn't have as much effect as a five foot variation from year to year; (although the witness stated he understood Massachusetts would make a diversion at any flood height) (969) that his feeling is very strong that any (970) change, by taking out the clear water of these tributaries, is going to adversely affect the run of fish, and their natural reproduction in these low waters; even so little as 2%, every drop; that he doesn't think any human being can tell just what these differences are but the diversion would take out of the river the clear waters of a pure stream which has the even temperature which fish like, every drop of which will affect the river. That his commission in 1925, after an investigation, published a report which said that in general the Connecticut River and its lower tributaries are favorable for shad migration and propagation but parts of the Connecticut River show bad pollution chiefly due to the sewage of Hartford and Middletown; that the sewerage from one large hospital at Middletown has since been removed from the river; (972) concerning the pollution of the river, his theory is that if there were no floods, the pollu-

tional conditions would be such that the shad wouldn't come up; that every spring the floods clean out the river and clean out these sludge beds and then comes the run of shad; that the shad don't come up all in one rush; they come up to one of these holes and rest in there (973) and then in the evening they start on up again; that when they get to a spawning area, they remain in that until after dark, and then start off into the swift water to spawn; that they spawn in the strong water; that that is the reason they need the flood water; that attracts them up, and they always go into the rapid water to spawn; that some shad are caught on the way down but mostly on their way up; that the State of Connecticut licenses the fishermen and regulates the industry; that the licensed number of nets has varied from 80 to 103 in recent years; that in these recent years where they have been observing this more particularly, the runs, as a rule, are larger on the flood, high floods; it is not a rule, however, to which there are no exceptions; (967) that May is the big month for shad; that a comparative showing of May floods and shad catch from 1913 to 1929 (Exhibit C-29) shows that they correspond in a general way except in the years 1922 and 1923; that Exhibit C-30 shows the total catch of shad, number of nets and pounds and fry produced by the state from 1872 to 1929 inclusive; (979) that the explanation of the small catch in 1915 and the large catch in 1919 might be that in 1915 there was a favorable hatching season and not many fish, or that the fish got by the nets up to the spawning ground and were not caught, or that in 1919, there was good natural reproduction, or that the prices were high and they fished night and day instead of fishing in a desultory way; that 1919 was the best year from 1913 to 1929; that you cannot always tell from a year how it happened that there appeared to be a larger run that year.

MR. JEREMIAH E. BECKWITH, of Saybrook, pilot and steamboat master, a witness for Connecticut testified (848) that the best effect of the 1927 flood was that it cleaned the river

out and twice as many shad were caught down on the lower end of the river than had been caught before in quite a number of years.

DR. WILLEM RUDOLFS, an expert witness for Connecticut testified (434) that if the amount of oxygen in the river is insufficient, fish life is affected; (435) that there is a higher oxygen requirement for fish life than to prevent nuisances; that certain fish require more oxygen than others; that eel, carp and catfish require less dissolved oxygen than fish like bass, pickerel and trout which like cleaner water; that the amount of oxygen required for fish life like shad is a minimum of 3.5 to 4 parts per million; that when the dissolved oxygen is lowered beyond this point, the fish begin to migrate, if they can, or if they cannot they begin to suffocate because there is not sufficient oxygen in the water for them to live; that, explaining Exhibit C-19, the upper line shows the dissolved oxygen throughout the summer, the broken line labeled oxygen balance shows the surplus of oxygen available, and the line labeled b.o.d. is the 5 day bio-chemical oxygen demand; (441) that fish in order to live need an amount of oxygen of 3½ to 4 parts per million; that is where the balance comes in; that there were a number of days that the river was so polluted, as shown by the oxygen balance on the exhibit at the state line that fish like shad must either migrate or die, that the oxygen balance as given at the last column on the right hand corner of Exhibit C-19 (442) shows that the oxygen balance was for a number of instances less than the oxygen required by the fish, if the river is used for oxidation of the sewage polluted material; (443) that the results of his studies as to fish life in the Connecticut river at the state line show that there were a number of days in which the river was so polluted at the state line that fish like shad, which is an indicator for this particular river, would either have to migrate, or, if they could not migrate, would have to die; that the lowest weekly average oxygen balance was 3.58, the week

of August 25-31, 1929; that 3.58 was on the border line; (449) that 4.08 is on the border line at which they start to migrate, just as much as 3.58; that the question of the number of days a fish has to be subjected to a certain oxygen condition is an entirely different story; that it is the amount of dissolved oxygen that determines the migration or possibly the life of the fish, not the oxygen balance; (578) that the figures as to oxygen at Hartford indicate that fish could live as conditions are just above the border line, at the time of average summer dry weather flows; (490) that the average flow of the Connecticut River at the State line for the period July 8th to September 14th, 1929 was 5,050 cubic feet per second; (491) that had the Massachusetts project been in effect during the period July 8 to September 14, 1929 (the period the witness had been speaking of in his testimony), there would have been no water diverted from either the Ware or Swift Rivers; but under the War Department findings, there would have been an improvement in the Connecticut River at the state line, (492) because of the release of pure and potable water from the Swift River Reservoir in addition to the normal flow in the river; (500) that with reference to Exhibit D-2 if the average flow of the Connecticut river had been 3,000 cubic feet per second and if there had been an average release from the Swift River reservoir of between 5 and 54 cubic feet per second on an average of 45 cubic feet per second, there would have been an increase of 1½% in the flow of the Connecticut River at the state line and an improvement in its quality.

MR. ROBERT SPURR WESTON, an expert witness called by Massachusetts, testified as follows:

> (1404) Q. "Have you or have you not any opinion on the effect of pollution and the effect of our (The Massachusetts) diversion as to fish life in the Connecticut River? A. I think it is entirely immaterial except as it may slightly raise the oxygen content in certain dry

months when the amount let down would be more than we have observed during the 14 months. There are, of course, dryer months than we observed, and during those months a release, under the rules of the War Department, would have some effect in improving the river. Generally, I think the effect would be immaterial."

MR. FRANK E. WINSOR, chief engineer of the Metropolitan District Water Supply Commission, an expert witness for Massachusetts, testified (1437) that he had prepared a diagram showing the shad catch in the Connecticut River in relation to May floods from 1880 to 1929 inclusive, basing the shad catch on the report presented by Connecticut and the record of May floods at Sunderland, Massachusetts by the United States Geological Survey and the records of the Holyoke Power Company; Exhibit C-29 (a); (1439) that this exhibit and exhibit D-12 (arranging the floods year by year in order of height) show that the highest catches have not corresponded to the highest May floods but rather the opposite is indicated; that the lowest catch happened at the time of the highest floods and the highest catch occurred when the flood was only moderately above the low point; that instead of the highest catches coming at the time of the highest flood, we get a higher catch at the lower flood.

WATER SUPPLY AND DEMAND IN EASTERN MASSACHUSETTS

It is agreed by both Connecticut and Massachusetts that the following statement may be taken as true.

Boston and the surrounding Metropolitan area are faced with a serious water shortage in the near future and there is a real necessity for their making provision for a large quantity of additional water which will meet the needs of the people of this region for a considerable number of years. The Metropolitan area consists of 20 cities and towns, and 15 other cities and towns are eligible to become members. These 35 cities and towns have a population of about 1,900,000. Other cities and towns must be considered in intimate connection with the Metropolitan District, because first they are likely to depend on the District Water Supply at some future time and secondly if the Ware and Swift waters are denied to Boston all the population in the northeastern part of the State must divide up existing water supplies. In this view the needs of the population of northeastern Massachusetts taken as a whole must be considered. The total population thus concerned is now 2,860,000, estimated likely to reach a total in 40 years of 4,572,000. The use of water is increasing and population is increasing. Dry seasons have occurred when the Metropolitan District has been imminently close to water shortage. Massachusetts witnesses stated that in 1970, owing to disuse of some of them, the present supplies will probably have decreased about 54,000,000 gallons per day and the consumption requirements will probably have increased from 244,000,000 gallons per day to 467,000,000 gallons per day, and that there will be a deficit of 178,000,000 gallons per day. The southeastern part of Massachusetts, including Cape Cod, seems to have sufficient supplies of water for itself and was not brought into the case.

It is agreed that the following table properly represents the total water consumption requirements in million gallons per day of northeastern Massachusetts in 1929, 1970 and 2000:

	1929	1970	2000
18 towns in Metropolitan District supplied with water	139		
2 towns in District not supplied with water by the District	8		
TOTAL	147	265	
15 towns eligible but not now in District	24	50	
10 towns just outside District	4	8	
20 towns further west	22	50	
TOTAL	197	373	511
18 towns in Ipswich group	22	47	70
37 other towns in potential group	25	47	72
TOTAL	244	467	653

It is also agreed that the following table represents accurately the amount of water in million gallons per day which Massachusetts witnesses stated is available and will be available in the years 1929, 1970 and 2000, in northeastern Massachusetts, excluding from consideration the Ware and Swift supplies:

	1929	1970	2000
18 towns in Metropolitan District	147	134	129
2 towns not supplied by the District	8	0	—
TOTAL	155	134	
15 towns eligible	27	18	
10 towns just outside	4	0	35
20 towns further west	22	20	
TOTAL	208	172	164
18 towns Ipswich group	13	6	0
37 towns potential group	37	26	22
TOTAL	258	204	186

Ipswich River (Hazen recommendation, not developed but available as a supply)	70	70	70
Assabet River (not developed but available as an emergency supply only)	15	15	0
TOTAL	343	289	256

It is also agreed that the following table represents the amount of water in million gallons per day which witnesses for Connecticut stated is now available for northeastern Massachusetts in addition to the supplies now developed by Massachusetts:

1. Fifteen Watershed Plan:		
A. Shawsheen-Ipswich development		
1. For Metropolitan District	78	
2. Reserved for local sources	22	
		100
B. South Sudbury Filters (in addition to present supply)		17
C. Lower Sudbury—Hobbs Brook		27
D. Assabet		35
		179
2. Merrimac River		200
TOTAL		379

It is further agreed that the following findings of the Special Master are correct:

> (Page 48) "So far as cost is concerned, there is no vast difference between the schemes and any of them is within the means of Massachusetts."
>
> (Page 52) "I have not gone into the comparative costs of the various projects because I think it is immaterial. There is no such wide divergence in cost as to make it a determining factor."

MR. NATHAN B. JACOBS, an expert witness for Connecticut, testified (1009) that he had made on original investigation of the water needs and available sources of supply in Eastern Massachusetts for the Boston Metropolitan District; that his study comprised an independent survey of all of the data which an engineer would consider necessary in connection with an investigation for water supply for the Metropolitan District; that this included population studies, use of water studies, present available facilities, and sources of supply which could be developed economically for a water supply for this District; that the Metropolitan District at present comprises twenty cities and towns in the vicinity of Boston and there are eligible to it fifteen additional cities and towns within a ten-mile radius from the State House at Boston, which might, within the next 30 or 40 years, become takers of water; (1010) that the cities of Lynn and Saugus, which are eligible for membership in the District, would probably not become users of Metropolitan District water within the next 30 or 40 years because of the adequacy of their own independent supplies; that Dr. Winsor's figures for the amount of water required to supply the 33 cities and towns eligible for membership in the District, excluding Lynn and Saugus, of about 315 million gallons daily in 1970, check very closely with his own figures; (1011) that for all practical purposes the demand which should be considered is between 300 and 315 million gallons daily for 1970 for all of the cities and towns in the District excluding Lynn and Saugus; (1023) that

> "we went at the investigating of eastern supply very much as an engineer or anyone would go at investigating the question of a water supply for a community or a group of communities, and we made a survey, going around through the state, the study of maps, the study of documents, getting leads from various sources";

(1024) that the investigation of possible sources of supply in Eastern Massachusetts for the Boston Metropolitan District to which he is testifying was made by

the organization of Morris Knowles Incorporated; that it included the study of practically all the sources of supply which had been investigated and reported on by others; that the work of Morris Knowles Incorporated was reviewed by Dr. F. Herbert Snow, Chief Engineer of the Public Service Commission of Pennsylvania, by Langdon Pearse of the firm of Pearse, Greeley & Hansen, Consulting Engineers of Chicago, by Dr. John H. Gregory, Consulting Engineer of Johns Hopkins University, Baltimore, Maryland, by Major Ezra B. Whitman, Consulting Engineer, of Baltimore, senior member of Whitman, Requardt and Smith, by Professor C.-E. A. Winslow of New Haven, and by Dr. Willem Rudolfs of Rutgers University, New Jersey; (1025) that these gentlemen went into the field following the first preliminary survey and on the basis of their field inspection, survey parties made field investigations of each of the sources of supply which had been agreed upon as a likely source for the Boston Metropolitan District; that the results of this work were brought into the office, plotted, studies made, preliminary plans drawn in some cases, estimates of cost prepared, analyses of water made, and this work was further reviewed by the Consultants; that the investigation included first a preliminary visit for selection of reservoir sites; (1026) that on the basis of that preliminary investigation, field parties were put out to make the surveys; that practically all of the Consultants went over the ground while these survey parties were in the field; (1027) that after the major portion of the surveys were completed, the sites were again visited, looking over the project with the surveys in hand; that conferences have been held from time to time; that the results of the investigation and conferences indicated quite clearly that the best supply that the Metropolitan District could obtain would be from the Merrimac River; that there is practically an unlimited supply for a great many years available in that river; that records were obtained as to the run-off of the river; that water analyses as published annually by the Department of Health of Massachusetts, were studied and supplemented by his own analyses, chiefly on dissolved

oxygen, biochemical oxygen demand, and carbon dioxide; that in view of all the considerations of this supply against any of the others, it appeared to be the very best supply available for the Metropolitan District; (1028) that he proceeded to investigate methods for purifying, conveying and delivering the water to the Metropolitan District and made preliminary plans and estimates of cost to see, first, whether it would be feasible and proper, and, second, whether the cost would be reasonable and within economic limits; (1029) that the drainage area of the Merrimac River at Tyng's Island, the proposed point of taking, just above Lowell, is 3,819 square miles, net, after excluding the drainage area of the Nashua River now developed as the Wachusett Supply, so-called, and used as a water supply by the Metropolitan District; (1030) that the average flow of the Merrimac River at Tyng's Island is 5,706 cubic feet per second, which is equivalent to about 3,700 million gallons daily; that the minimum monthly flow available by drawing down the pool above the Lowell Dam would be about 650 million gallons daily; that the average flow of the Merrimac, 5706 cubic feet per second, is about one-third of the flow of the Connecticut river at the Massachusetts-Connecticut state line; (1031) that the proposed plan for taking water from the Merrimac River contemplates the construction of intakes in the river at Tyng's Island, a pumping station well above the maximum flood height which is approximately 105 feet above sea level; that the capacity of this intake and of the entire project was assumed for purposes of investigation and design to be 200 million gallons daily; that this figure of 200 million gallons daily was selected because it was approximately the amount of water which the Metropolitan District proposed to develop from the Ware and Swift; that it was not because the yield of the Merrimac River is limited to 200 million gallons daily, nor because the Metropolitan District needed that amount at this time, but a plan was wanted which looked to about the same point for safe yield of water supply as the Ware and Swift project; (1032) that in a general way, summarizing the investigations which were made as to the quality

of this water, it is that of a river carrying a considerable amount of industrial and domestic wastes; that the equivalent population on the watershed of the Merrimac River above Tyng's Island is between 400,000 and 500,000 persons; that he looked particularly for those qualities of a water supply which affected the problem of treatment, as to whether there was anything in it which would limit in any way the use of this water under ordinary improved methods of water purification; that the 1928 report of the Department of Health of Massachusetts showed that the average number of bacteria per cubic centimeter at the Lawrence intake, which is several miles below Tyng's Island, was 210; that the significance of this figure may be judged by a comparison with the bacterial content of the raw water used as a source of supply in American cities of over 100,000 population, having a filter plant; that there are 41 such cities, and records were available from 35; that 5, namely, Providence, R. I., Detroit, Mich., Hartford, Conn., Cambridge, Mass., and Buffalo, N. Y., had lower bacterial counts than the Merrimac River in 1928; (1033) that 30 cities are using water supplies having, before treatment, a higher bacterial count than the Merrimac River in 1928 and that these include some of the outstanding cities of the country, in regard to the question of good, pure, safe, potable water; that the color of the Merrimac River water is high compared to the color of some of the water that he deals with, particularly in the central part of the country; (1034) that most of the Massachusetts streams are high in color; that the Ware River water before treatment or storage has a color of 57; that color can be removed and reduced; (1036) that the color of the Quinepoxet River, tributary to the Wachusett Reservoir, has a color of 38; that the Swift River at West Ware, below the confluence of the three branches of the stream, has a color of 30; (1037) that the hardness of the Merrimac River water was 17 parts per million which, with the exception of the water supply at Providence, R. I., is lower than that of any of the 17 cities of over 100,000 population where the data were available; (1038) that the results of his engineering studies con-

vinced him that this was a very good water for purification for a public water supply; (1039) that Exhibit C-31 shows a general plan of structures for the development of a water supply from the Merrimac River; that the pumping station was considered to have a capacity of approximately 200,000,000 gallons a day, though he put in 300,000,000 gallons a day pumping equipment with the idea that in case the largest unit was out of service there would still be a capacity of 200,000,000 gallons a day; that from the pumping station at Tyng's Island pipe lines lead to Foster Martin Reservoir; that the water would be pumped against a total head of about 76 feet; (1041) that this reservoir is designed for storage and will be kept filled; that it would have a capacity of about 18 billion gallons; that this is a natural reservoir site capable of development by building a dam and dike about existing ponds known as Foster's pond and Martin's Pond; (1042) that this site was found to be fairly well on a direct line between the point of taking the water at Tyng's Island and the final delivery point in the Metropolitan District at Spot Pond, which is a presently-used distribution reservoir of the District having a very large capacity, capable of equalizing any fluctuation in the hourly or weekly demand of the system; that the Foster-Martin Reservoir would hold the water for a period of days in order to provide storage for preliminary treatment of the water from the river; that storage is the only treatment and purification now used by the Metropolitan District; (1043) that the reservoir would be baffled by building a dike, so that the water would have to travel in the reservoir the entire distance from the point of inlet to the point of outlet; that this preliminary treatment by storage would remove practically all of the bacteria and considerable of the color and furnish at the outlet a water very easy to treat at a modern filtration plant; that this reservoir provides a storage period of 90 days; that it reduces materially the loading on the filter plant; (1045) that eighteen billion gallons is the total capacity; that he considered no draw-down, nor any loss from evaporation; that, in other words, he considered it purely as a storage purification; that

storage is the method of purification that has been used primarily on the Metropolitan District supplies and on a great many supplies; (1046) that intestinal bacteria die off very quickly and it would be fair to state that 85 to 90 percent of them would die within the first 3 or 4 days of storage; that by the end of two months, 99 percent of the intestinal bacteria entering the reservoir would have died, showing the enormous purification that takes place just by storing water; that he does not believe that in any supply this should be the only safeguard of the purity; that there should be other protection to the purity of any water supply used, particularly if the source of supply is at all subject to contamination; (1047) that practically all of the organic material contained in industrial wastes would be removed by the storage proposed in the Foster-Martin Reservoir; that nevertheless, the filtration plant has been laid out so that all the protection which would be necessary even for the most polluted supply would be provided; that the water would be aerated, treated chemically for coagulation, filtered, and chlorinated; that the aerators and filtration plant would be located about 3,000 feet away from and below the Martin Pond Dam; that there will be four units of aerators ultimately, each unit being able to take care of about 50 million gallons per day; (1048) that from the aerators, the water would pass to mixing chambers; that the mixing chambers provide a retention period of about 20 minutes; that these chambers would be of the "around-the-end" baffle type so that the water travels criss-cross through the chamber at the rather rapid velocity of about one-half foot per second; (1049) that above the chambers is located the chemical feeding machines and facilities for introducing lime and alum into the water; (1050) that provision is made in the plant for pre-chlorination; that after leaving the mixing chamber, the water passes into the coagulation basins which provide a detention period of about 4 hours and the capacity of the basin is such that the water passes through at the rate of 1.1 feet per minute; (1051) from the coagulation basins, the water would be taken onto the filters which are of the rapid sand or mechanical

type; that this type was adopted chiefly for its color removing propensities; (1052) that spare units are provided in the filter plant in case a few units are taken down for cleaning or for resanding or for any other purpose; (1053) that the filter units are made in the form of a concrete box 30 feet wide by 48 feet long on the bottom of which is a manifold, or a collecting system of pipes; that on top of the manifold is coarse gravel, then fine gravel, and finally about 30 inches of sand and on top of that about 4 feet of water which would come over from the coagulating basin; that this is the usual process of rapid sand filtration used continuously in America for about 30 years and is now almost universally adopted; (1055) that this filtration plant is different than the one built at Lawrence, Massachusetts which is of the slow sand type; that the filters at Lawrence take the water out of the Merrimac River in the City of Lawrence directly onto the slow sand filters; that these are large units made up similar to the rapid sand filter units in that they have sand, gravel and an underdrainage pipe system, but instead of passing the water rapidly through at the rate of 125 million gallons per acre per day they pass the water at only about 3 million gallons per acre per day; that no coagulation is used but dependence is placed entirely on the so-called schmutzdecke which is formed about the sand grains; when the filters become clogged so that the water does not pass through even at the rate of 3 million gallons per acre per day, the units are shut down and the filters are scraped, the sand washed and replaced on the filters; that in the mechanical or rapid sand filter type the washing of the sand is accomplished without removing any of the sand from the unit by reversing the flow of water through the filter from a downward to an upward direction; (1056) that in washing, the water passes up through the gravel and the sand and overflows into a drain and that carries out any sediment or deposit which has accumulated during the time the filter has been in operation; that at Lawrence there is no storage and no sedimentation preliminary to filtration; that the water at Lawrence is good water; (1057-1058) that from the filtration plant at Foster-Martin Reservoir,

the water would be pumped by a high lift pumping station to Spot Pond in the Metropolitan District; (1060) that a 200 million gallon per day filter plant would not be necessary at the present time, that the installation of some pumping units could be deferred, also the construction of some filters, coagulation basins and one-half of the filtered water reservoir; (1063) that after treatment, the quality of the water from the Merrimac River would be equal to the quality of the best water supplied anywhere; that it would be better than the present Boston water supply; that additional sources of supply were studied in Eastern Massachusetts but if the Merrimac project were adopted additional supplies would not be required; that he thinks that the supply from the Merrimac River is unlimited; (1064) that in the examination of supplies other than the Merrimac River, the first thing that occurred to him was the conservation of the present supplies; that merely because certain supplies have become polluted they should not be abandoned; that it would be well to conserve them by filtration and purification; that if filters were installed on the Sudbury supply immediately a greater yield could be relied upon from the existing sources; (1065) that the entire Sudbury area has not been developed because, as explained by Dr. Winsor, there is (1066) some pollution on this watershed; that filters have been recommended by others; that he thinks that a filtration plant at this point would be a very decided step in the direction of utilization of the present supplies; that the most important supply outside of the Merrimac is a development of the Ipswich River supplemented by the Shawsheen River, in what he has termed the Shawsheen-Ipswich development; that this is a comparatively good development and a large one, developing a water supply of more than 100 million gallons per day; that two large storage reservoirs would be constructed on the Ipswich River and three small reservoirs on the Shawsheen River; (1068) that the total drainage area which would be developed on the Ipswich River would be 121 square miles; that in developing this river it would be economical to develop with it the Shawsheen River; that the water from the reservoirs

on the Shawsheen would be pumped over the divide between the Shawsheen and the Ipswich into the latter river; (1069) that the water would flow down the Ipswich River through the two reservoirs on the Ipswich to the filtration plant and pumping station, located on the Willowdale side of the lower Ipswich reservoir; (1070) that the Ipswich River is considered part of the water supply for Lynn and Saugus which have not been considered a part of the Metropolitan District even in 1970; and that there are other cities and towns in the immediate vicinity that could well be supplied from such a large development as that proposed on these rivers so that of the 100 million gallons per day developable yield from the Shawsheen and Ipswich 78 million gallons per day would come into the Metropolitan District and the balance would be reserved for use by local communities; (1071) that 23½ million gallons per day would be reserved for the local communities; (1072) that this is the amount of water that they would reasonably be expected to require in 1970; that the additional yield by the development of the Sudbury filters would be 17 million gallons per day; (1079) that the next project considered for development was the enlargement of the present Cambridge Water Works system and its development into a larger supply by increasing the elevation of the present reservoir on Hobbs Brook and augmenting the small drainage area of Hobbs Brook by pumping water from the Sudbury River at a point above Concord into the enlarged Hobbs Brook Reservoir; that this would increase the yield by 27 million gallons per day; that Cambridge will be in the Metropolitan District long before 1970 and therefore this would be a logical increase of the facilities and of the watershed that they have; (1080) that this water comes primarily from the Sudbury River and is called "Lower Sudbury" in his work as distinguished from the other references which have been made to the Sudbury such as North Sudbury and South Sudbury; that the water which would be collected is that which runs off the drainage area of the Sudbury river below the present reservoirs in the Metropolitan District; (1081) that the next development con-

sidered was the filtration of the Wachusett supply; that it appeared to him that with the passing of time and the growth of population on the watershed, particularly on the Wachusett, filtration of Wachusett water must be contemplated within the next 40 years; that he considered that a filtration plant would be built below Sudbury Reservoir No. 5; that Boston will eventually come to the filtration of the Wachusett supply unless additional property is purchased to protect it; that it is possible that if the Merrimac River were developed Boston could retain increasingly large amounts of water for storage in the Wachusett Reservoir and rely on storage as they do now, with the addition possibly of chlorination; that in the economic development of these present resources Wachusett water and Sudbury No. 5 reservoir water will be filtered and when that is done it will be possible to increase the supply still further by developing the head waters of the Assabet River, the Assabet being that stream which lies between the watershed of the Nashua and that the Sudbury and joins with the Sudbury to form the Concord; that the Wachusett aqueduct carrying water from the Wachusett reservoir to the Sudbury reservoirs passes through this drainage area; (1082) that in general, the diversion of water from the Assabet would be from the smaller drainage areas of the head-waters; (1084) that the development on the Assabet River is from 9 small water sheds, totalling 58.8 square miles of drainage area; (1083, 1084, 1090) that these nine small watersheds have respectively drainage areas, capacities, and elevations as shown in the following table which summarizes the data testified to by the witness on these pages. The letters designating the watersheds correspond with those shown on complainant's Exhibit C-32.

Water-shed	Drainage Area	Capacity of Reservoir	Elevation
A	11.3 sq. mil.	212 million gallons water to be pumped into Reservoir B-1	230
B-1	5.3 sq. mil.	848 million gallons water pumped to Wachusett Aqueduct	330
B-2	4.3 sq. mil.	716 million gallons water flows into Wachusett Aqueduct	330
C	15.1 sq. mil.	38 million gallons water pumped into Wachusett Aqueduct	230
D	1.6 sq. mil.	65 million gallons water to flow into Wachusett Aqueduct by gravity	325
E	4. sq. mil.	48 million gallons water to flow into Wachusett Reservoir by gravity	300
G	6.5 sq. mil.	193 million gallons water to be pumped into Reservoir E	300
H	7.7 sq. mil.	264 million gallons water to be pumped into Reservoir I	320
I	3. sq. mil.	180 million gallons water flows by gravity into the aqueduct	280

(1085) that the total yield, including present sources, would be 304 million gallons per day available for the Metropolitan District after deducting water required by local communities from the Ipswich River; (1086) that the increased yields over the present supply would be 157 million gallons per day; that an examination of analyses of water from each of these sources of supply during 1928 and 1929 indicates that the water is of such a quality that it could be treated without difficulty by filtration; (1087) that there is no good reason why these waters cannot be filtered and used; (1333) that he considered the Merrimac project preferable to that from other sources in Massachusetts described as the "Fifteen Watersheds Plan"; (1334) that he did not propose to draw at once 200 million gallons per day from the Merrimac River, but he would still keep all the present sources of supply which the

Metropolitan District had and supplement them by the Merrimac River; that his plan was for a water works capable of drawing 200 million gallons per day from the Merrimac River when that amount was needed; that the Foster-Martin storage reservoir was intended primarily for purification purposes, but the storage was equal to 18 billion gallons which was considerably longer storage than was economically required ahead of filtration so that there would be a possibility of some drawing down there to equalize the monthly flow of the Merrimac River; that he didn't consider any draw-down in his plans for the project but that a draw-down is possible; that it could be drawn down to 10 billion gallons without defeating the purposes for which it was planned, and it would still perform its functions satisfactorily and with the same hygienic results; (1335) that the idea was to find a good storage reservoir with anywhere from 30 days' storage up and he found one of 18 billion gallons capacity and it was decided the longer storage period probably would not hurt; that some people might think that 60 or 90 days' storage was better than 30 days' storage. (1337)

Q. What? A. We had one site that is even larger than that, but this site seemed to meet all of the requirements.

Q. But your general plan is to keep it full, isn't it? A. Yes. A great many years.

Q. What did you find the low flow on the Merrimac River at your intake point? A. May I have one of my boys give me the copy of the statement which I have just handed to you?

Q. Yes. A. The low flow of the Merrimac River, based upon the discharge measurements at Lawrence, Massachusetts, which is below the Tyng's Island, was the month of July, 1911, when the average flow per square mile was reported as .266 cubic feet per second.

Q. Give us that again, please. A. .266 cubic feet per second per square mile of net drainage area. The reason I emphasize the word "net" is because the Government reports the flow as gross and net, the deduction being for the Wachusett and Sudbury areas, which are considered as bein "out" in the net flow.

Q. Well, they are out as far as the Merrimac is concerned, I suppose aren't they? A. With the exception of the dry weather release, they are out. And that dry weather release is accounted for separately on the Merrimac River gauge at Lawrence, Massachusetts. So that, taking those figures out, that is, taking out both the land there and the dry weather release there, the Government calculated the figure of .266 cubic feet per second per square mile.

Q. Would that be increased by the release? A. Slightly.

Q. Do you know how much? A. Well, when I used the word "slightly" (1338) it should have been explained. If we were reporting really a flow in cubic feet per second per square mile, if we include the release and also include the mileage, why it will decrease the yield per square mile. But it is a very small quantity and we disregarded it.

Q. I see. So you took the .266? A. We took the .266.

Q. Can you translate that into cubic feet per second or into gallons or something else? A. That was equivalent to 660 million gallons per day, average for the month of July, 1911, at Tyng's Island.

Q. Was that for the whole month or a single day? A. No, that is for the whole month.

Q. That is average for the month? A. That is average for the month, and we considered that that was a fair indication, because, with two billion gallons storage, that could be equalized throughout the month.

Q. How would you equalize it? We are not talking about the period when you need two hundred millions a day? A. Well, we are talking about the period when we might need the 650 million gallons a day. It is quite a long time off, and with two billion gallons in storage you could equalize the flow of that month so that you would be able to have an average flow for the month, each day, of six hundred sixty millions of gallons.

Q. In the river? In the river? A. From the river, yes.

Q. From the river? A. Yes.

Q. You don't mean that you could divert that amount from the river, or do you? A. You could divert it, yes.

(1339) Q. Six hundred and fifty million gallons a day? During that month you are speaking of? A. Yes,

if you are going to take every drop of water that is in the river.

Q. If you are going to? A. Yes.

Q. If you are going to, but you don't need to, do you? A. We are talking about the total flow of the river, as I understand.

Q. Yes, I am talking about the total flow; you say it averaged 650 million a day? A. 660 million gallons a day, at Tyng's Island.

Q. Yes, and that therefore it would be possible, every day, to take that number of gallons? A. Yes, with a storage reservoir of two billion gallons.

Q. And where is that reservoir? A. Well, there is a storage of almost two billion gallons in back of the Pawtucket dam at Lowell.

Q. Is that the dam of the locks and canals people? A. Yes. I considered that flow, if the time ever came when the city of Boston or the Metropolitan District, or the State of Massachusetts needed the whole flow of the Merrimac River, that you could get your two billion gallons storage at that time.

Q. Out of that mill pond? A. Well, you would get it some place else. I wouldn't think you could get it out of that mill pond, no. I merely mentioned the mill pond to show how small an amount of storage the two billion is, to equalize that flow.

Q. You would either get it from there or provide it somewhere else? A. Yes.

Q. Well, supposing you take it from there, would there be any water left in the mill pond? A. No, I don't think there would (1340) if you are going to assume that sort of a condition.

Q. Well, that was the condition you were assuming. A. No, I am not assuming that you are using that mill pond. I merely mentioned that mill pond to give you an idea of what two billion storage is.

Q. Well, I understand you would have to use some storage somewhere to get your water, wouldn't you? A. To get 650 million gallons a day.

Q. Yes. A. Yes, indeed.

Q. How about two hundred million? A. None.

Q. What? A. I don't think we would need any. Well, I will take that back. During that time there were several days when the flow was less than two hundred million gallons a day.

Q. So that if you took two hundred million gallons on those days would you take it from that mill pond? A. Yes,—Let me explain why. These measurements are made at Lawrence.

Q. Lawrence? A. And when the river was low, which I assume was the two Sundays during the month, that the extreme low times occurred, the flow at Tyng's Island was probably greater than the proportion of the flow which passed Lawrence, the storage being held back in Pawtucket dam, so that probably the flow at Tyng's Island was greatly in excess of the amount which I have computed by taking the proportionate drainage area to Lawrence. (1341)

Q. Well, as you compute it, what is it? A. Sir?

Q. As you compute it, what is it? A. The lowest figure which I computed was the 23d of July, which was only 54,000,000 gallons per day. That was based on 98 cubic feet per second at Lawrence.

Q. And on that day you would rely on the mill pond for the balance of the water? A. If there was only 54,000,000 gallons coming.

Q. You do not think there was very much more, do you? A. Yes; I imagine there was considerably more.

Q. Do you imagine that there was 200,000,000 gallons? A. More than 200,000,000.

Q. You think the flow at Tyng's Island was as much greater than at Lawrence? A. Yes, because the flow on Saturday was 445,000,000 gallons, the flow on Sunday was 54,000,000 gallons per day, and the flow on Monday was 715,000,000 gallons.

Q. That is all at Lawrence? A. This is at Tyng's Island, based on allocating Lawrence. Putting it the other way, the flow dropped from 805,000 cubic feet per second on Saturday at Lawrence to 98 cubic feet per second, and increased on Monday to 1,296 feet per second, showing that the water was being held back and piling in back of the Pawtucket dam.

Q. The last figures were at Lawrence? A. Yes.

Q. Your computations at Lawrence were what for those three days? A. My computations at Lawrence were 445,000,000 gallons on Saturday, 54,000,000 gallons on Sunday, and (1342) 715,000,000 gallons on Monday.

Q. I suppose in your computation you took into consideration the probability that the big dams up in Manchester were holding back water on those days? A. Well, that is possible too.

Q. That would affect the flow of water at Tyng's Island, wouldn't it? A. Yes, sir.

Q. Those dams are not in Massachusetts? A. That is true. I did not give the matter very much serious consideration because of the fact that we could on that day pull down a few hundred million out of the Pawtucket dam or we could pull a couple hundred million out of the storage of 18,000,000,000 at the reservoir site. We had so much leeway that you could not get down to the bottom.

Q. During those low day flows, you would take what percentage of the flow of the river? A. On those particular low days?

Q. On these July days which averaged, I think you said 650,000,000 gallons, didn't you? A. Yes—about 30 percent.

Q. About 30 percent would be diverted from this interstate stream? That is the amount? A. Yes.

Q. It was agreed, I believe, that the diversion from the Connecticut River, of the Ware and Swift project, averaged for the year two percent, wasn't it? A. Averaged for the year, yes. You are not comparing that with the low flow, with the lowest record in 40 or 50 years?

Q. No; I am not. A. I just wanted to be sure.

Q. The diversion on the Connecticut River was two percent, (1343) average for the year? A. For the years, based on average, not on any particular year.

Q. Of the average flow of each year the diversion was two percent? A. The average flow of all the years was two percent.

Q. In the period of low flow of the Connecticut River, the so-called diversion, under the restrictions of the War Department, would result in an actual addition, would it not? A. Yes, sir.

Q. To the Connecticut River? A. Yes, sir.

Q. If the Ware River project had been in operation in this month of July, 1911, and if your project had been in operation on the Merrimac, the comparison would have been that 30 per cent of the flow of the Merrimac would have been diverted and some addition to the flow of the Connecticut would have been con-

tributed? Is that right? A. I believe that is a fair statement.

Q. What consideration did you give, in planning this project, to the fact that the Merrimac River was in part navigable? A. I did not go into it.

(1344) that the Merrimac River below the point of diversion lies entirely in the State of Massachusetts; that it is entirely within the Commonwealth from Tyng's Island to the sea; that he considered also the fact that the river lay mostly north of the Massachusetts State line; that he saw no objection in that fact to using the Merrimac River as a water supply, any more than to the use of the Ohio by the cities in Ohio, considering that the watershed above those cites is almost entirely in Pennsylvania, or to the use of the Beaver River for water supply in Pennsylvania when certain branches of this river are almost entirely in Ohio; that he does not see where that had any effect; that he does not consider that the pollution of the Merrimac River, north of the State boundary line, was beyond the control of the State of Massachusetts; that at least one-third of the pollution above Tyng's Island came from Massachusetts and probably if Massachusetts adopted a conservation policy of cleaning up its streams the other states would follow in line; (1345) that regardless of that, a storage reservoir would so completely eliminate any question of doubt in regard to the use of this river that he did not consider it further; that he does not think it will be long before Springfield, Massachusetts, will clean up its sewage mess; that as far as pollution on the Connecticut River is concerned the river would be greatly benefited by cleaning up the pollution above the Massachusetts-Connecticut State Line; that he did not investigate the sources of the water of the Merrimac River in New Hampshire; that he did not go up to Winnepesaukee, Squam or Merrymeeting Lakes; that he did not go above Manchester; (1346) that he did not examine the legislation of New Hampshire regarding the regulation of the flow of these lakes; that he knows nothing about those lakes or the legislation respecting them; nor the acquiescence of Massachusetts in

that legislation; (1348) that if the War Department were to apply the same requirements to the Merrimac that were applied in the case of the Swift River, that is, a minimum flow of six tenths of a cubic foot per second per square mile of watershed, there would be no diversion permitted when the flow was less than 1,500 million gallons per day on the Merrimac River;

> (1349) (By Mr. Warren) Q. If the War Department adopted the same standard as on the Connecticut, would that mean that the War Department would not permit any diversion or might it mean that the War Department would not permit any diversion when the flow of the river was less than 1,500,000,000 gallons a a day? A. If there was navigation down there that justified it, that is what it would mean.
>
> Q. And if it did mean that, how long a period in that year of 1911 would we be unable to draw our 200,000,000 gallons a day when we needed it? A. I don't know.
>
> Q. From the Merrimac? A. I don't know.
>
> Q. You haven't the flow data to answer that? A. No, not here.

(1350) that if the Ware River rule were applied to the Merrimac River there would be four months in which no water could be taken; that the Army Engineers did not say that no water could be taken out of the Connecticut River during these four months; that he does not think they would apply the same rule on the main stream as they did on a tributary; that he does not think they would apply these rules to the Merrimac River at all; that the question of the effect of diversion on navigation on the Merrimac River was raised in connection with his investigation, but the only navigation on the Merrimac River was tidal, practically deep water navigation at the mouth; (1351) that he personally decided that navigation had no bearing on the question of diversion of water from the Merrimac River for the Metropolitan District; that he had given no consideration to the effect of the proposed diversion on dilution of industrial and domestic wastes in the Merrimac River below Lowell from a diversion of 30 per cent of the flow of the Merri-

mac River; that he made no investigation of what the nature of those wastes were nor as to how much water ought to be required to dilute them or make them less offensive; that he had seen the report of the Massachusetts State Board of Health in which it had been recommended that either these wastes be taken into a long intercepting sewer, or some method of purification or disposal resorted to; (1352) that he thinks that individual treatment plants for these wastes are more desirable than an intercepting sewer carrying the wastes out to sea; that the communities along the Merrimac River ought to take care of their wastes; that if 30 per cent of the available water at the most critical period should be diverted it would be increasingly important to take care of these wastes; (1353) that these disposal plants were necessary whether the Metropolitan District diverted water from the Merrimac River or not, according to the report of the Massachusetts State Department of Health; that according to this report, they were indispensable; that they had not been built; that if they were built as a result of diverting 30 per cent of the dilution water, they might have to be paid for by the Metropolitan District; (1357) that he had made no study of the growth of population in the Merrimac River watershed, nor any comparison between the population of that watershed and the population of the Ware-Swift watersheds; (1358) that he estimates the population equivalent, both actual population and industrial waste equivalent, above Tyng's Island on the Merrimac River at something like 400,000 or 425,000; that other things being equal, he would prefer to take a water supply from a watershed with a population of 37 per square mile, rather than from a watershed with a population of 88 per square mile; that other things again being equal, he would prefer to take a less rather than a more polluted water initially; that if he were consulted as to the source from which to take a water supply, the opinion of the public that was to use the water supply ought to be considered; that, assuming that two sources are available, it may be that public opinion would be the controlling element; that a condition cannot be assumed without knowing all the facts;

that the watershed that showed the lowest percentage of population growth per square mile would probably be preferable to the watershed that showed the greatest percentage of growth per square mile; that the weight which he would give to public opinion in the selection of a source of water supply would depend upon an evaluation of the circumstances which might arise in any individual case; that where everything else was equal, public opinion might be a controlling consideration; that he thinks the quality of the water would probably have a great deal to do with such an evaluation; (1360) that he would give weight to the fact that one water could be brought to its destination by gravity and another would require pumping at two different points in its progress only as this factor affected the cost; (1361) that Morris Knowles Incorporated designed and supervised the construction of the addition to the filter plant at Lawrence, Mass., in 1925; (1362-1363) that prior to this time, in 1917, in a report on sources of water supply for Lawrence to the Lawrence Water Supply Commission, Mr. Knowles recommended that the City obtain a supply elsewhere than from the Merrimac River; (1364) that in the plans for diverting water from the Assabet River, he investigated the use of water in the Assabet Valley for process purposes, and decided that rather than include in the plan a compensating reservoir, he would allow a certain amount to go down the stream past his storage dams similar to the amount of water that is allowed to go down the streams past the Wachusett and Sudbury Dams; (1365) that the quantity of water to pass the dams is 3 million gallons per day on the Assabet River; that this would be the average amount of water that would be let down; that he did not go into the element of the particular time in which this amount of water would be released; (1372-1373) that he examined the bottom soil of both the Foster-Martin reservoir and that on the Ipswich River at Willowdale but made no borings; that in both cases in general that this was sandy soil; that there was considerable muck on the Foster-Martin reservoir site which he planned to leave in place, except where located beneath the embankments; that

he made no particular investigation of the bottom soil of the Ipswich River reservoir except at the dam site; (1553-1565) that Exhibit C-34, prepared under Dr. Rudolfs' direction, shows in diagrammatic form the equivalent population of the domestic sewage and industrial wastes entering the Merrimac River and its principal tributaries from the Contoocook River above Concord, New Hampshire, to Tyng's Island in Massachusetts as determined by him in a field survey in 1929; (2212) that during the four summer months, July, August, September and October, of the extreme dry year 1880, the natural flow of the Assabet River was 1,690 million gallons; that of this flow 827 million gallons would have been the natural flow from 56 square miles which would not have been affected in any way by the diversions so that the water which would have been diverted, had no water passed the dams during this extreme low period, would have been the difference or 863 million gallons; that he has explained that a release from the dam is contemplated in the amount of an average of 3 million gallons per day throughout the year, or 1,095 million gallons per year and if this amount had been released during these four summer months, there would have resulted an actual increase in flow of something like 10 per cent; that he had testified that the average release would be equal to 3 million gallons per day throughout the year and that this dry weather release could be distributed in larger amounts during the dry time and in lesser amounts during the wet periods of the year; that the same type of release was suggested not only for the Assabet but also on the other projects such as the Ipswich and the Shawsheen; that, for example, there were 3 million gallons per day computed as release required on the Shawsheen River which could be described as desired safe regulation and is at least as much as Mr. Eddy testified was required by the large plant of the American Woolen Mills at Shawsheen Village; (2213) that with respect to navigation on the Merrimac River, recommendations have been made in Document No. 2 of the 61st Congress for increasing this depth to as much as 18 feet; that the channel was to be constructed by means

of locks and dams so that the diversion of water above would not in any way affect the carrying out of this project; (2214) that figures shown in Government reports upon the navigability of the Merrimac River indicate that the amount of water required for the operation of the project proposed, was only 85 cubic feet per second; that if the entire project were carried out and 310 cubic feet per second diverted (200 millions per day) there would be no effect on navigation by such diversion; that the proposed project does not depend at all upon any flow of water in the Merrimac River with the exception of 85 cubic feet per second for lockage; that if the Foster-Martin Reservoir were drawn down so that it contained only 10 billion gallons, there would be no swamp land exposed within the reservoir area; that when it was thus drawn down the minimum depth over the area of swamp material would be 18 feet of water; (2216) that the testimony of Mr. Uhl was based primarily on the assumption that water was to be diverted in the amount of 200 million gallons every day; that Mr. Uhl assumed that any loss over 2,250 cubic feet per second is a loss of primary power, and yet the records show that the flow at Lawrence for the whole month of July 1911 is only 1,190 cubic feet per second and that would be equivalent to only 1,060 cubic feet per second at Lowell; that therefore the limit at which the diverting of water from the Merrimac River would really have affected the primary power is less than half the amount which has been stated, so that most of the power loss would be loss of surplus power; (2219) that the installed steam horsepower at Lawrence in 1918 was 75,380 horsepower against installed water power capacity of 25,535 horsepower, and at Lowell it was 25,000 horsepower steam units as against 29,943 horsepower water units; (2220) that Mr. Uhl's calculations of power damages were based on the assumption that the diversion would be 200 million gallons per day beginning at the present time, whereas the fact is that the plan contemplates a gradually increasing taking of water from the Merrimac River only reaching 200 million gallons per day in 1970, and on this basis Mr. Uhl's calculation should be on the present

worth of the damage which is to be expected and that this amounts to $850,000 which compares with his (Mr. Jacobs') figures of $1,000,000 for the damages; that another check on that would be the estimated figure of the Army Engineers who stated that the loss in the driest years would only amount to $3,000 with the diversion of 85 cubic feet per second, based on Lawrence where the head was only 28 feet; that at Lowell the head is 36 feet so that on the same basis that loss would be about $3,900, or a total for the two powers in the dr[illegible]st year of $6,900; that if 310 cubic feet per second were diverted instead of 85, it would increase it to $25,000, which capitalized at 5 per cent would be $500,000; that that was a pre-war price so that it might be doubled to give $1,000,000; that present power costs are not double pre-war prices; (2223) that excerpts of the report to the Lawrence Water Supply Commission of 1917 by Morris Knowles Incorporated show that one of the advantages of the site finally recommended for Lawrence water supply was that Merrimac River water could be pumped into it and stored in the recommended reservoir on Bartlett Brook; that some of the other excerpts show the prejudices and the inefficiencies which existed in Lawrence, all of which he feels have been corrected by the project as outlined for a much larger district than the small city of Lawrence; that in spite of the fact that this report was made 13 years ago and other reports have been made since, Lawrence still takes its water out of the Merrimac River and the filtration plant has been improved; that he does not think that Lawrence objects to the use of the Merrimac River water; (2227) that one of the first projects considered in connection with the Foster-Martin Reservoir was an alternate comprising two reservoirs, but after the discovery of the reservoir site giving a capacity of 18 billion gallons, it was felt that there was ample protection in this capacity, particularly with the inclusion in the plan of a baffle dike to which this site readily lent itself; that the glue plant, whose wastes have a population equivalent of 114,000 persons, testified to by Mr. Eddy, is located on the Allegheny River less than 15 miles above the intake of the City of Pittsburgh Water Works; that the only way to get anything

worth while, in the way of a navigation project, between Haverhill and the sea on the Merrimac River, is the plan as recommended for the construction of locks and dams; (2233) that the flow now of the Merrimac River is so affected by the manipulation of the power dams, that the Army Engineers did not consider anything other than a slack-water navigation

> "similar to what we are familiar with on our inland rivers—similar to the operation on the Ohio, for instance, the Mississippi and the Monongahela and the other rivers"; (2246-2248)

that the storage capacity of his nine proposed reservoirs on the Assabet River would be 2,564,000,000 gallons; (2248) that the proposed release in dry weather from these reservoirs would be equivalent to 3,000,000 gallons per day or 1,095,000,000 gallons a year; that this release could be distributed in any way desired; that there is (2249) plenty of storage there;

> Q. Yes, but does your plan contemplate that amount of storage all the time in those little reservoirs? A. I didn't go into the details of how it would be operated.
>
> Q. Well, I am asking you whether your plan contemplated that amount of storage in those reservoirs? A. 2,564,000,000 gallons.
>
> Q. So that it would be available, there, to let down? A. Yes, sir.
>
> Q. Independently of what was diverted for use by the Metropolitan District? A. Oh, no.
>
> Q. Well, what do you mean by no,—that it would not be there? A. You would have 2,564,000,000, but you are not going to use that for stream regulation, you are going to use most of that for water supply.
>
> Q. And the balance for stream regulation? A. Yes.
>
> Q. And there would be enough—there would be that amount, you stated, of 1,095,000,000 left for stream regulation? A. Well, it would not have to all come from storage. You could use the dry weather flow to supplement it.
>
> Q. And did you make any calculations of what the dry weather flow was in the river? A. No, I accepted Mr. Goodnough's calculation.
>
> Q. Of those branches? A. Yes.
>
> Q. The little branches? A. Yes.

DR. WILLEM RUDOLFS, an expert witness for Connecticut, testified (470) that the Connecticut River, if judged by water supply standards, would need considerable treatment before the water could be used; (1100) that he made studies as to the quality of the water in the Merrimac River; that it is a good water for potential water supply with treatment as proposed by Mr. Jacobs; that a polluted water can be treated so that it is potable when there is no storage capacity available, by the use of chemicals, filtering and, as a safeguard, chlorination; that if possibilities of storage for a number of days, say 30 or more, are available, the stored water can be treated with chemicals in order to remove suspended and other material, bacteria included, filtered and then chlorinated; (1101) that he doesn't see that any better water supply can be obtained; that storage causes a reduction in bacteria, turbidity or suspended material, and color; that coagulation is the addition of chemicals to cause the material in suspension and part of that in solution to floc out or to form a floc; that the floc is then filtered out on the sand filter Mr. Jacobs described, and the impurities are taken out; that a rapid sand filter is nothing but a screening device holding back the material to be removed; that when a reservoir turns over, an unpleasant, disagreeable taste, sometimes even odors, result; that if water is sprayed into the air it comes into contact with the oxygen in the air and some of the oxidizable material will be oxidized and some of the gases which caused the odor will be driven out; (1102) that in some instances aeration is used after filtering to reduce the aggressive acidity or the corrosiveness of the water; that Boston at present relies upon storage; that campers in the woods might easily contaminate a storage reservoir; that storage has the object of reducing the number of bacteria; that this reduction in thirty days or more is at least 98 percent; that he has conducted experiments and finds that sewage, when stored for 13 days, has a reduction in bacterial content of 95 percent, and after 51 days, of 99 percent; that Sir Alexander Houston, of the London Metropolitan Water Board, states that a month's storage suffices

to kill harmful bacteria; that he thinks that Sir Alexander Houston is correct, at least for 99 percent; that other people have made similar experiments and obtained similar results; (1103) that when small particles settle out of water in storage they have a tendency to carry some of the color with them; and that there is a bleaching effect of sunlight; (1104) that the effect of storage is to decrease turbidity; that the turbidity in the Merrimac is very slight, about one part per million; that one type of industrial waste can be classified as material, either organic or inorganic, capable of settling; that this material would settle out and go to the bottom; that another type of industrial waste can be classified as material in solution; that as in the reduction of color, this material would be removed by settling particles; that some of the material in solution is oxidized and changed so that it is not harmful and produces no nuisances; (1105) that the Boston water supply, as he understands it, has chlorination only as a standby, and relies entirely upon storage; that no modern engineer would rely upon storage only unless he had storage of several years; that practically all surface water, including rivers, creeks and ponds, is somewhat polluted; that if he had storage of a year or two, he would still chlorinate; (1106) that the bacterium coli index of the Merrimac River in 1928 was 4200 in 100 cubic centimeters of water at the Lawrence intake; that storage for 30 days or more would reduce this number by 98 percent, leaving 84; that coagulation and filtration would remove 99 percent of the remainder, leaving 0.84 B. Coli per 100 cubic centimeters, which is below the Treasury standard; (1107) that the Treasury standard is 1 B. Coli in 100 cubic centimeters of water; (1108) that chlorination is mixing a certain quantity of liquid chlorine with the water; that chlorine is a strong antiseptic and will kill any bacteria that might have escaped all other treatment; that you would not get the some result with chlorination if you left out all other processes, as the chlorine would not penetrate into the small particles in suspension and kill the organisms; that if the water had been stored and 99 or 99½ percent of the bacteria removed, chlorination is satis-

factory; (1109) that the Wachusett Reservoir should be chlorinated as a safeguard; (1110) that starting out with a B. Coli index of 4200, removing 98 percent, there are 84 left, which might be enough to cause an epidemic; that he did not analyze Wachusett water; that with modern plants, the human element is very small indeed; (1111) that with the treatment processes described, there is a series of safeguards; that by the time water is treated with all the processes there is a much better chance for satisfactory water than if reliance is on only one safeguard; that of all the treatment processes, storage is not the most effective; there are many towns that must rely on filtration to get a good pure and safe water; (1112) that he can think of no large city in the United States, outside of Massachusetts, that doesn't chlorinate its water; that chlorination is a standard practice; (1113) that if the Merrimac supply, after being treated by all the processes described, were chlorinated properly, it would have no taste from the process; that color in most rivers is caused by decayed roots and leaves, brownish material, showing in solution; that experiments were made on samples of Merrimac River water with colors of 35 to 43 parts per million by adding a certain quantity of alum which resulted in a reduction of color to 7 parts per million, which is under the Treasury Department standard; (1114) that the Treasury Department standard was 10; that the turbidity of the Merrimac River water was very low and would be reduced by coagulation and filtration still further; that if alum is added to water, the alum being acid would cause the water to become acid and attack the pipes; that in order to neutralize this acidity, lime is added to get a water that is perfectly safe; (1115) that aeration was recommended for the Merrimac project to remove taste and odor-producing gases; that if the Merrimac River water was stored and treated as described by Mr. Jacobs, the treated water would be safe and pure, and equal to or better than the present Boston water supply; that the Merrimac water stored and treated would be as good or better than the proposed Ware-Swift supply; (1116-a) that if the Ware-Swift supply was not chlorinated, the Merrimac water would be

safer; that any of the supplies when treated such as the Assabet, Sudbury and Ipswich, would be equal to or better than the present Boston water supply, and better than the proposed Ware and Swift supplies without chlorination; (1118) that if cost were no consideration, he would prefer the less polluted of two sources of water supply; that the Ware and Swift waters initially are better than the Merrimac water; (1119) that if cost and legality and things of that sort are not considered, the Ware and Swift are to be preferred to the Merrimac; (1120) that in recommending a source of supply for the city, cost usually goes first and then convenience; that as regards unity of sources, he would prefer the Ware and Swift supplies to supplies having sixteen watersheds and would prefer the Merrimac supply to the Ware and Swift supplies; (1124) that raw water stored improves in quality, in freedom from bacteria, in reduction of color and turbidity, and in oxidizable material; that if a reservoir for storing water after filtration were well protected from pollution, whether or not the water was stored would make little difference; that if cost were not a consideration, such a storage reservoir should be covered; (1125) that he knows of open and of covered reservoirs; (1127) that since plankton and small animals and plants depend for their subsistence on food supply and the food supply has been removed by filtering, they would not grow much faster since microscopic growth depends mostly on the food supply; (1128) that he believes that the covering of distribution reservoirs might be more to prevent subsequent pollution than to keep the light out; (1129) that the covering of filtered water reservoirs was an historical outcome of the manner of building reservoirs; (1131) that he agrees with Mr. Hazen that stored water might have some growth but not because it is filtered; (2250) that investigations were made of pollution in the Merrimac River, starting July 12, 1929, and ending October 31, taking samples every day at Tyng's Island, for dissolved oxygen and biochemical oxygen demand; that the average for that period of 111 days was 6.54 parts per million of dissolved oxygen,

or 70 percent of saturation, (2251) and 1.9 parts per million biochemical oxygen demand; that the average stream flow for that period was 1518 cubic feet per second, as given to him by the Engineers, and the temperature averaged 18.8° Centigrade; that the Merrimac River at Tyng's Island is 40 percent better than the Connecticut River at the Massachusetts-Connecticut State Line, as far as dissolved oxygen is concerned, and (2250) 24 percent better as regards biochemical oxygen demand; (2253) that the usual practice of removing corrosive agents from water was by applying lime or, in some instances, by aeration; that peat is a material that decomposes slowly and that it would furnish food for microorganisms in water supply reservoirs, increasing the growth of algæ and necessitating the application of copper sulphate once or twice a year in order to overcome the growths; that the methods used in a few instances for treating water containing phenol and paper waste, known as lignine, is by activated carbons; (2254) that waste phenol in the amount of 10,000 tons a year is dumped into the Emscher River in the Emscher district in Germany in addition to the sewage and other things that go in; that water from the Emscher seeps through the soil and still contains some phenol; that it is then filtered through carbon and the taste is removed; that there have been experiments in this country and some plants are being built to do the same thing; (2255) that the taste at Lawrence only occurs in that part of the city where the water is put directly in the mains after it has been filtered; that after the water has been stored, there is no taste; that the reason is that bacterial action takes place and the phenols break down rapidly; that experiments have shown that 50 to 60 percent of the phenols break down in three or four days and all of the phenols have disappeared in twelve days, by bacterial action in storage; that water is not manufactured, but purified.

MAJOR EZRA B. WHITMAN, an expert witness for Connecticut testified ((1158) that he had made an investigation as to the water supplies available for the Metropolitan District in Eastern Massachusetts; (1161) that he thought the storage of Merrimac River water as proposed for 90 days will eliminate practically all objections to the use of that source; that in the studies that were made by the Massachusetts State Board of Health on the Merrimac River, he does not recall that there was any study as to the storage of the water previous to filtration; that with the stored water from the Merrimac followed by filtration and chlorination, there would result one of the best water supplies in the United States; (1164) that in practically all the different places where he has been called in as a consulting engineer to advise the city as to its water supply, the question of cost was a dominating and determining factor; (1166) that the Fifteen Watershed Plan is the kind of development being made every day; (1167) that the drainage area of the Ipswich River at Willowdale Dam is 121 square miles and the available drainage area from Wachusett, 108 square miles;

> (1172) Q. (By Mr. Warren) Mr. Whitman, are you now in charge of the Albany Water Works Department? A. Yes, my firm is.
>
> Q. Yes. Well, were you consulted before it was undertaken? (1173) A. No. I was in very much the same situation that Mr. Winsor is in the Boston situation. They had selected—although we did help them to select the particular project.
>
> Q. You did help them to select . . . A. Yes.
>
> Q. Including the source? A. Including the source.
>
> Q. Of supply? A. Yes.
>
> Q. What is that source of supply? A. The source of supply is from what they call the Hannacrois-Basic Creek supply; that goes to the Catskill foothills, and we take two streams—water from two streams, the Hannacrois Creek and Basic Creek.
>
> Q. In the foothills of the Catskills? A. In the foothills of the Catskills.
>
> Q. They are south of Albany, aren't they? A. Yes, a little south-west of Albany.

Q. A little south? And how do you take the water to Albany? By pumps? A. No, take it by gravity.

Q. Gravity? A. Yes.

Q. Where did Albany get its water before? A. Got its water from the Hudson River.

Q. That was an ample supply, wasn't it? A. Yes, very ample supply.

Q. Plenty of water? A. Plenty of water.

Q. Did you recommend that they continue to get it from the Hudson? A. No, I would not have recommended that they continue to get it from the Hudson.

Q. You would not? A. No.

Q. They had their works more or less established at the time, didn't they? A. Yes.

Q. What was the matter with the water? A. The trouble with (1174) the water in Albany was that, with the growing industrial communities from Schenectady practically right down to Albany, and with the sewage going in just within a few thousand feet of the intake and with the pulp—

Q. You mean above or below it? A. above it.

Q. Yes. A. The sewage going in right above it, so that there was practically fresh sewage going into the intake; with the *pulp paper mills—pulp mills coming down and interfering very largely with the filtration processes;* also with the filtration plant where it was in danger of being flooded out by high water, as once happened from the Hudson, and with the water in such a condition that it was a tremendously expensive water to handle, that is to filter, it costs probably three or four times as much to filter the water in Albany as it would in an ordinary city.

Q. Where is the intake with respect to Albany? A. It was just at the north end of Albany. But the whole shore practically up to Troy is more or less built up with practically solid towns.

Q. Well, I am familiar with the river, just as I am with the Merrimac. A. Yes.

Q. Of course if that water had been stored, 98 per cent of those impurities would have disappeared in 60 to 90 days? A. Yes.

Q. And if it had been filtered there would have been less than one per cent left, wouldn't there? A. Yes.

Q. And the chlorination would have absolutely wiped that out, wouldn't it? A. That is correct.

Q. And the city would have saved all of the expense of going to the foothills of the Catskills? A. Oh, no, no, you haven't (1175) let me finish my story, Mr. Warren, in connection. The cost of filtering is very high. Also every drop of water has to be pumped.

Q. How many drops of the Merrimac would not have to be pumped to the city of Boston? A. It would all have to be pumped.

Q. Every drop? A. Every drop, but when we did this—

Q. How many times did you pump it, under that scheme? A. How many times did we pump it?

Q. The Merrimac water, yes. A. Twice.

Q. Twice, A. Yes. Well, now, Mr. Warren, what actually happened from an economic point of view—point of view of economics, Mr. Nicholas S. Hill was called in to advise the city of Albany, first, and he did, as to whether to stay in the Hudson River or to go out of the Hudson River.

Q. Who is he? A. He is a consulting engineer of New York.

Q. Yes. A. He figured that by going to a supply such as we selected that you would save ten million—I think about ten million and a half dollars by capitalizing the cost of filtration and pumping and the reduced expenses that would come through this other source of supply. The actual expense on that proposition is about nine million dollars. So that your capitalized savings will pay for this new supply, to say nothing of getting a water supply that is very much safer where you have no chance of being flooded out with your filtration plan and the difficulties of that plant that it is not a plant that was built to handle such a water and they have . . .

Q. Which? The present? A. The present plant.

Q. The present Hudson plant? A. The present Hudson plant. There are plants that could be built, I think that could (1176) handle that water very much better than the existing plant that they have.

Q. Did you make any estimate on what such a plant would cost? A. Oh, I can tell you roughly what a plant of that kind would cost, probably around one million to a million and a quarter dollars.

Q. You mean a proper plant for the treatment of the Hudson? A. A proper plant, yes. I would not treat the

Hudson River because the water there is a very difficult water to treat. Some waters yield readily to treatment and others do not. Apparently it is the *pulp wastes* which interfere very considerably with the filtration process.

(1177) Q. Those are quite a distance up the river, are they not? A. Some distance up the river.

Q. Where are they,—up around Lake George, up in that vicinity? What is the name of the place there? A. They are up in the upper Hudson, up above.

Quite a good many miles above this intake, aren't they? A. Yes—I should say, judging from the records and the experience in the Merrimac River, that the Merrimac River is a very much easier water to handle than the Hudson River water is, considering the results that have been obtained in Albany. Those two plants were both built as slow sand filter plants. The Merrimac plant has kept on as a slow sand filter plant with no practical additions. The Albany plant was built as a slow sand filter plant. They added three filters to it. That didn't work. They have added aeration and they have added, in addition to that, coagulation, and they have kept adding to that plant, trying to make it work. It doesn't work—it has not worked satisfactorily.

Q. You were saying it has not worked satisfactorily? A. It has not worked satisfactorily, and the Merrimac River plant at Lawrence has worked satisfactorily, according to the best information which I can get.

Q. What do you say it would cost to put in a proper plant there? A. I wouldn't put in a proper plant there. I wouldn't attempt it.

Q. I thought you said $1,000,000? A. I said a plant that would handle it better than the present plant could be built (1178) for a million or a million and a quarter, but I would not attempt to handle it at that point.

Q. As long as you could get it from a mountain stream at the foot of the Catskills you would prefer to go there? A. Particularly as you would pay the interest on the cost of developing that mountain source by the savings in filtration cost and pumping cost.

Q. You would not filter this water from the foothills of the Catskills? A. Yes, we do.

Q. Your filtration plant would not cost as much? A. Your filtration plant would not cost as much and it would not be as difficult to operate.

Q. Why wouldn't it cost as much? A. You mean the plant itself?

Q. Yes. A. I was thinking of the filtration.

Q. I am speaking of the filtration? A. The process of filtration. You wouldn't need to use, probably, more than half or quarter the amount of chemicals that you use in treating the Hudson River water, and your chemicals in the filtration process are the large element of cost.

Q. You mean the alum and the lime? A. They use on an average four grains of alum to the gallon in treating the Albany water supply. The usual amount that you use is about a grain to a gallon.

Q. Why wouldn't you have to use as much on this water from the Catskills? A. Because the water hasn't the chemical and the industrial wastes in it, of all kinds, such as come from those industrial cities all the way up the river to Schenectady.

(1179) Q. Is it because the water is less polluted? A. There are practically no industrial wastes at all in the supply that we get up there, while the industrial wastes in the present existing intake at Albany are very considerable.

Q. Are there also domestic wastes? A. Yes, there are domestic wastes too.

Q. And there are no domestic wastes to speak of in the Catskill waters? A. No. There are a few small communities up there

Q. In fact, I think you said it was as pure as the water of the Swift and the Ware? A. I think it would compare very favorably with them."

(1183) that he had made no investigation of the growth of population on the Merrimac River watershed; (1184) that he did not find in his studies that anyone had ever before recommended the Merrimac River as a source of water supply; that most of the contribution of waste to the Merrimac River is above the proposed intake.

WATER SUPPLY

DR. JOHN H. GREGORY, an expert witness for Connecticut, testified (1243) that he was one of a group of engineers asked to review the studies made by Morris Knowles Incorporated on the development of possible water supply projects in Eastern Massachusetts for the Boston Metropolitan District; (1245) that he is in substantial accord as to the yield of the projects, and the cost and the practicability of them, as water supply sources, with Mr. Jacobs; (1245) that he considers the Merrimac River development practical; that there is nothing unreasonable about it; that it is a reasonable development considering its cost; that the resultant quality of the water, if treated in accordance with the works proposed, that is, with the storage reservoir, aeration, rapid sand filtration and chlorination, is one of the highest quality, of fine appearance, sparkling, and perfectly safe for anybody to drink, and equal to the best supplies in the United States; that he has been connected with the construction of various supplies in the United States and has visited and inspected a great many other supplies with which he had no direct professional contact; (1246) that the supplies in other cities are comparable with the project on the Merrimac River; that there are many cities that are filtering polluted waters and that are producing fairly satisfactory water; that there are many large filtration plants in the United States of the rapid sand type and there are also plants of the slow sand type; that Washington, D. C. has both types; that Washington, D. C. has recently constructed a rapid sand filtration plant taking water from the Potomac River; that the City of Cleveland has two large rapid sand filtration plants; that the City of St. Louis has one large rapid sand filtration plant taking water from the Mississippi River and has now under construction a second large plant to take water from the Missouri River; that Detroit has the largest rapid sand filtration plant in the world; that this plant takes water from the Detroit River; that New Orleans has a large rapid sand filtration plant, taking water

from the Mississippi River; that Cincinnati has a large rapid sand filtration plant taking water from the Ohio River. Louisville the same way; that Columbus has a rapid sand filtration plant, taking water from the Scioto River; (1247) that some of the raw waters that these cities are using are polluted to a lesser degree and some to a higher degree than the Merrimac River; that there are also many smaller cities that are treating water with rapid sand filter plants; that the degree of pollution of the raw water in the Merrimac River is not so large that it is impracticable by filtration processes to make it suitable as a potable water; that the places that he has mentioned depend largely upon filtration and chlorination for the treatment of water; that in the case of Cincinnati they have two preliminary settling reservoirs which afford some eight days' storage, but most of the plants are taking the water direct from the river, treating it with coagulants and passing it through mixing chambers, settling tanks, rapid sand filters, and finally chlorinating; that it is a well known, almost standard method of water purification; that the rapid sand filter today in the United States is more widely used than any other type of water purification works; (1248) that the storage provision at the Foster-Martin Reservoir would very materially improve the quality of the water to be filtered; that the estimate of cost for the Merrimac River project was made on the basis of 200 million gallons per day yield for the water filtration plant, and there is very much more water available in the Merrimac River than that quantity; that 200 million gallons per day in the Merrimac River would not exhaust that supply; that the quality of the water treated as proposed from the Merrimac would be superior to the water delivered as proposed from the Ware-Swift project; (1250) that water after filtration should be stored in covered reservoirs; that the same thing applies to a surface water if it has been brought to a point in a distribution system where it is then to be distributed; that on the other hand, there are many examples of filtered waters which are kept in uncovered distribution reservoirs; for example, Albany, New York; Cincinnati, Ohio; Trenton, New Jersey;

part of Philadelphia; and Baltimore; (1251) that if the reservoir is not covered, and algae growths occur, the safety of the water for public consumption is not affected; that algae growths might result in an unpleasant taste and odor; that algae growths in reservoirs are controlled by the use of copper sulphate; (1253) that the development of the Fifteen Watershed Plan is entirely practicable; that it would give a water of excellent quality and better than the present water supplied to the Metropolitan District; (1256) that other things being equal, it is simpler to operate a works with a large unit like the Merrimac project than a number of small units like the Fifteen Watershed Plan, but as for the water, he thinks both of them, or either of them, will give a water of a high grade, meeting the requirements of the United States Treasury standards; (1259) that irrespective of whether the water came from the Merrimac and is filtered, or whether it came from the Ware and Swift, when it has been brought to the point where it goes into the distribution system if it is necessary to protect the quality, the reservoir in which it is stored should be covered; (1260) that there is much more water in the Merrimac River than 200 million gallons per day; that the volume that can be taken from the Merrimac is not limited by a statement made on the basis of estimates of 200 million gallons per day; that the water of the Merrimac River if treated as proposed will give a thoroughly high grade of satisfactory water that will fully meet the requirements of the United States Treasury standard and will be a better water than the water brought from the Ware and the Swift down through the Wachusett system and delivered to the Metropolitan District; (1263) that all of the water in the Ware and Swift Rivers can be fully developed with a storage of between 134 and 140 billion gallons; that he cannot see why such a large reservoir of between 300 billion gallons and 400 billion gallons, as proposed by Massachusetts, would be needed when a considerably smaller one would serve to take all of the water; (1266-1267) that from an engineering point of view, assuming that by 1970 or before, the Metropolitan District demand for water has

approached the safe yield of all sources and the Swift River reservoir has been built, the logical place to get more water is from the watersheds in the vicinity of the Swift River reservoir so that Swift River reservoir storage would be utilized; (1268) that it would not be practical to take Eastern Massachusetts water supplies and pump them over to the Swift River reservoir; (1269) that future additions to the Ware-Swift project must come from other tributaries of the Connecticut River; (1271) that there is something like 35 million gallons per day available from Assabet River tributaries, which on the basis of per capita consumption of say 110 gallons per day, would supply a population of nearly 320,000 persons, and if Boston today has a population of perhaps 900,000, the water from the Assabet is sufficient to furnish one-third of the water supply for the city of Boston; (1272) that the Whitehall Reservoir in the so-called South Sudbury watershed of the present Metropolitan District sources has a small watershed, Ashland has a small watershed, Hopkinton has a small watershed, and if you take the present sources of supply of the Metropolitan District, there is Wachusett, Sudbury No. 5, Framingham No. 3, Framingham No. 2, Framingham No. 1, Ashland, Hopkinton, Whitehall and Cochituate, which make nine sources of supply that have to be handled at the present time; that he sees no difficulty in handling these nine, nor does he see any difficulty in handling the nine smaller ones on the Assabet River; (1272-1276) that the nine sources of supply which constitute a portion of the present Metropolitan District sources did not constitute a system laid out and constructed at one time, but a system developed by addition of one and then another to an existing system; (1278) that the present Boston system of delivery to distribution system is by gravity; (1294) that he did not consider the substitution of a single dam on the main Assabet River in place of individual dams on nine tributaries because the Assabet Valley has the Boston and Maine Railroad running through the heart of it and it has the cities of Hudson and Maynard, and it did not look desirable; (1225) that if a single dam were built on

the main stream of the Assabet River, it would be necessary to pump all of the water into the Wachusett Aqueduct; (1299) that there is probably some process water required in the industrial establishments in Maynard and Hudson on the Assabet River; that the development of the reservoirs as proposed would cut off a certain amount of the flow of the Assabet River and still leave a considerable area of the Assabet River that would not be cut off; that he had not figured what percentage of the total flow of the Assabet would be cut off; that the reduction in the flow would be felt most in the dry period; (1300) that no borings were made at the site of the proposed Ipswich river dam at Newburyport turnpike; that there would be no difficulty in building a reservoir at the proposed Willowdale site on the Ipswich River; (1302) that if he were consulted by the Metropolitan District as to going to the Merrimac River or as to going to the Ware and Swift Rivers for approximately the same amount of water, assuming that the cost would be approximately the same, or that the client did not care about any difference in cost, he would take the Ware and the Swift as the lesser polluted streams; (1303) that there is an advantage in having an entirely independent source of supply coming into the District from an entirely different direction; (1304) that the question of pumping water is a very simple thing; (1305) that in considering a source of water supply, he would take into consideration the population on the watershed, but with adequate treatment it would not be much of a factor; (1306) that from his visit to the two watersheds, there is less density of population on the Ware and Swift Rivers than on the Merrimac River; (1308) that the preference of the public as to a water supply is a sentimental factor that sometimes has to be considered if the question of cost is eliminated; (1310) that the opinion of the public which is to use a water supply is a factor to be considered by engineers in determining the source from which the water will be taken; (1314) that if gas house wastes (the phenols) are present to a material extent and chlorine is added it will probably intensify the taste; (1315) that there have been troubles

at times in the Ohio River but the manufacturers have now largely taken out the phenols by treatment at the works; that judging from the experience of Lawrence with chlorinating the Lawrence filtered water, he hasn't known that the phenols were a factor; that in the past there has been some feeling in Lawrence against the Merrimac river water; that he understands that it has died down at present; (1316) that the Massachusetts State Board of Health have not been in favor of filtering Merrimac river water; that they say it can be done; that he knows of no instance in which any commission or state board of engineers, prior to this case, has recommended the use of the Merrimac river water even for communities along the Merrimac River in Massachusetts; that in general the larger part of the wastes which would be present in the water at Tyng's Island came from New Hampshire; that the fact that this waste came from New Hampshire might be a factor in determining on the source of water supply; (1322) that he gave no consideration to providing a compensating reservoir for maintaining the summer flows on the Assabet River above Hudson; (1326) that the increase or decrease in density of population on a watershed would be a factor to be considered in selecting a source of water supply; (1329) that he believes the proper method of treatment of the gas house and paper mill wastes would be sedimentation of some kind together with oxidation; that storage and aeration plus filtration would take care of the gas house and paper mill wastes on the Merrimac; that a water works engineer would prefer a few units to a multiplicity of small units; (1331) that he thinks the Merrimac River is a better source of water supply for the Metropolitan District than the Fifteen Watershed Project; that he did not determine how much water was available from the Merrimac River; (2192) that many large cities pump all of their water supply; that the question of the pumping lift for raw water has nothing to do with the situation if you are going to filter and purify water; (2194) that the effect of discharging sewage and industrial wastes into the Merrimac River and its tributaries can be judged by the analyses of

the quality of water at Tyng's Island; (2198) that the best way of judging the efficiency of water purification processes is by the reduction in typhoid fever death rates before and after filtration.

PROFESSOR CHARLES-E. A. WINSLOW, an expert witness for Connecticut, testified (509) that there are various standards by which one may judge a stream; that the Connecticut River is not suitable for drinking without treatment; that the standard for water for drinking is 1 colon bacillus in 100 cubic centimeters of water; that no surface stream meets such standard without treatment; that Connecticut River water could be used as a source of water supply if it were properly treated; that it is beyond the limit generally considered safe for treatment by filtration and chlorination alone; that it is regarded, according to generally accepted standards, as a water to be first stored, then filtered, and finally chlorinated; (510) that the cost of this treatment would be high; that the Public Health Service estimates that for every increase of 100 colon bacilli per cubic centimeter, the cost of treatment increases $10.00 per million gallons; that Connecticut River water was used by the City of Hartford for drinking 25 years ago, when, during the winter months, their reservoir froze up and they drew directly from the river; (511) that they suffered from typhoid as a result; (525) that the Connecticut River compares with other streams used or proposed to be used for water supply, as follows:

	Colon Bacilli per Cubic Centimeter
Mississippi above Minneapolis	13
Maumee at Toledo	20
Allegheny at Pittsburgh	21
Ohio at Louisville	22
Grand at Grand Rapids	26
Delaware at Trenton	29
Ohio at Cincinnati	30
Mississippi at St. Louis	31
Maiden Creek at Reading	42
Merrimac at Lawrence	42
Mahoning at Youngstown	54
Schuylkill at Philadelphia	59
Connecticut above Hartford	68
Missouri at Kansas City	159
Hudson at Albany	194
White River at Indianapolis	225
Connecticut at the State Line	378

(526) that he took the average for the Connecticut for July to November, 1928; that the Connecticut above Hartford is the best point on the river; (527) that his figures included only the true bacterium coli, whereas the other figures include the entire colon group which would tend to make them higher than his; (1135) that storage will effect a reduction of bacteria of all kinds that will grow on the jelly media commonly used of about 90 percent in a period of three or four weeks; that his figure will vary with the kind of bacteria concerned; (1136) that of colon bacilli placed in water, 78 percent survived one day, 49 percent three days, five percent five days, and one percent ten days; (1137) that with colon bacilli the rate of reduction is equivalent to about 2½ percent per hour of those alive at the beginning of the hour; that the rate of decrease remains constant but the actual decrease gets lower because the number that die in a given period is a percentage of those living at the beginning of the period; that another factor of importance is the action of other organisms in the water which destroy bacteria; that light and temperature also affect the process; that the main factor is that the intestinal

bacteria are in an unfavorable environment and die out because they cannot live and develop; (1138) that the time element is the controlling factor and is effective regardless of whether the water is at rest or in motion; that typhoid bacilli die out from 8 to 20 or 30 times as fast as colon bacilli, varying somewhat with the temperature; that Sir Alexander Houston in London found that, depending on the temperature, the typhoid bacilli die out in from one to, at the outside, eight weeks; (1139) that the higher the temperature the quicker the bacteria die out; (1141) that the proposed reservoir for the Merrimac River is so designed that it would give a 60-day storage to all water that goes through it; that sometimes short circuiting of water occurs; that the reservoir to be used in connection with the Merrimac supply provides a central dike to avoid such short-circuiting; that he is confident that the water will get at least 60 days' treatment, probably nearer 90; that this will effect a minimum purification of 98 percent; that assuming that the Merrimac River contains roughly 5,000 colon bacilli per 100 cubic centimeters, there will not be over 2 percent of that or 100 per hundred cubic centimeters leaving the reservoir; (1142) that he had studied the analyses of the Merrimac River as given by the Massachusetts State Board of Health and also, with regard to certain qualities of the water, the analyses of the United States Geological Survey; (1143) that according to all ordinary standards the water was suitable for treatment by chlorination and filtration so as to make it a source of potable water; that the water had a high bacterial content, a high color as compared with that desirable and too much iron for an ideal water; that all of these qualities can be easily handled by the type of treatment proposed; (1144) that there is no doubt this process will reduce the color of 40 down to a value of 10 or less; that he believes that filtration and chlorination alone would yield a satisfactory water; (1145) that Lawrence, where there is a less complete and effective filtration plant than here proposed, has obtained a water which, in at least one or two years, has been pronounced by the State Department of Health as better than that of the

Metropolitan District; that the typhoid rate in Lawrence has been one of the very low rates in the country; that the water is, he believes, considered suitable for treatment by filtration and chlorination, even without storage; that, however, it is desirable to add the additional safeguard of storing; that there are three general methods of treating water: storage, filtration and chlorination; that he believes that any two of those three in combination would make a satisfactory water; that he believes that the third should be added because even with the other two there is a possibility of some slip; (1146) that the water is not so seriously damaged by manufacturing wastes that there would be difficulty in treating it; that there are many cities in the United States and in Europe successfully treating water more polluted than the Merrimac by filtration and chlorination without storage; that he had prepared the following list of cities now treating water almost as polluted or more polluted than the Merrimac, as measured by colon bacilli:

	Colon Bacilli per 100 Cubic Centimeters	Colon Bacilli per cubic centimeter (Computed from evidence
Toledo	1980	20
Pittsburgh	2058	21
Louisville	2220	22
Grand Rapids	2563	26
Trenton	2891	29
Cincinnati	2980	30
St. Louis	3120	31
Lawrence	4200	42
Reading	4219	42
Youngstown	5450	55
Philadelphia	5899	59
Kansas City, Kansas	15892	159
Albany	19400	194
Indianapolis	22500	225

(1148) that none of these cities had any extensive storage; that he had divided the cities of the United States of over 100,000 population, according to their source of water,

and determined their typhoid death rates for the five years 1924 to 1928; (1149) that these groups, with their typhoid death rates per 100,000 were as follows:

7 cities having underground water supplies	6.4
20 cities which used a water supply of rather good quality without filtration including Boston, Bridgeport, Conn., New York and some cities using chlorination but not filtration	2.1
A third group of cities using treated water of fairly good initial quality by filtration	4.2
A fourth group treating river waters of very poor quality by filtration, including Albany, Indianapolis, Kansas City, Missouri, Philadelphia, Reading, St. Louis, Wilmington and Youngstown	3.0

that this computation is a little unfair because certain groups, particularly groups 1 and 3, have a number of southern cities in them which, on account of their negro population, have high typhoid rates; (1150) that the differences found obviously have no significance with regard to water supply; that these rates are so low that the conclusion is that there is no appreciable amount of typhoid due to the water in any of these groups; (1151) that starting with a water with a B. Coli index of 5,000 per 100 cubic centimeters and storing and filtering the water, the water will then have a B. Coli index of 1 per 100 cubic centimeters, which is the standard for good drinking water; that he believes it wise to chlorinate in addition; that chlorination would "catch the last one"; (1153) that he believes the soundest plan for the Metropolitan District is the development of the Merrimac River, but that the development of the small supplies is, from a health standpoint, entirely feasible and satisfactory; (1154) that there are three criteria of a satisfactory water supply: 1st, the water must be safe and unobjectionable from a standpoint of color, turbidity, taste, etc.,—2nd, there is the factor of economy,—and 3rd, there is the factor of water conservation policy; that he liked the Merrimac plan better than the smaller supplies because it is more compact and allows for possible expansion on a larger

scale; that the Merrimac supply developed as described would be very much better than the present water of the Metropolitan District; (1158) that the effect of storage on industrial wastes would be toward removal of the heavier suspended matter by sedimentation and the oxidizing of organic wastes of a decomposable or oxidizable nature into harmless forms so that most of the more important waste would be taken out by storage; (1450) that the Massachusetts State Board of Health is an unusually good one and far above the average; that he knew the late Commissioner Kelley very well and considered him a competent and efficient head of that Department; that he had confidence in his judgment; (1451) that between the Ware and Swift River supply and the Merrimac River supply, he would recommend the Merrimac for the Metropolitan District; that this decision was based upon three things: 1st, the quality of the final water which would be produced as regards color, odor, taste, etc.,—2nd, the cost,—and 3rd, the extent to which the given supply interferes with other communities within or without the state; that the initial purity of the water from these two sources would not weigh with him at all, if a water could be produced of the same or better purity at a lower cost; that leaving cost out of the question he would be willing to start with a considerably polluted water if the process was to yield a water of equal or better quality at the end; (1452) that as an expert he would not give any weight to prejudices or opinions of the consuming public in a community that was to be supplied; that if he were to have any political responsibility he might have to; (1453) that he had no doubt of the scientific possibilities of making a good water out of the Connecticut River; (1454) that with entirely satisfactory ultimate quality the only two questions of significance are the cost and the relation to the needs of other communities; that one community should not hog the water at the expense of another community; (1455) that taste, odor and hardness are important in water supply questions, coming under the heading of "Quality"; (1456) that except for hardness which affects the pocket-book, there is no reason to consider them

except that the public does not like them; that to his knowledge, there is no community taking water from the Connecticut River for a water supply, either in Massachusetts or Connecticut; (1457) that he knew of no community in Massachusetts that uses the Merrimac water except the City of Lawrence; that he was familiar with Mr. Knowles' report to the Water Commission of Lawrence in which abandoning the Merrimac water was recommended; that this report was influenced mainly by public opinion; that according to the report the Merrimac water could be made satisfactory;

Q. Have you ever seen or heard of a reply by the State Department of Public Health of Massachusetts to the City Council of Lawrence, answering certain questions, and dated April 15, 1922. A. I don't remember that.

Q. Supposing that there was such a report—response, rather—And that question was submitted to the State Board of Health, as follows: "Is it advisable, from a viewpoint of safety and precaution, that the city of Lawrence seek a new water supply and, if your opinion is in the affirmative, what considerations make it advisable?" (1458) And supposing that the response of the Department was as follows: "The Department in answer to this question has carefully considered the history of the present water supply of the city of Lawrence since it was first installed nearly fifty years ago. When introduced in 1873 the supply was taken in part from a filter gallery near the river and in part from the river itself. In time very little water was obtained from the filter gallery and the chief source was the Merrimack River, from which the water was drawn directly into the supply pipes of the city. For many years the city had a high death rate from typhoid fever. This matter was the subject of careful study by the State Board of Health after its appointment in 1886, and the source of this typhoid fever infection was traced by the late Hiram F. Mills, C. E., member of the Board, to the use of the polluted water of the Merrimack River for the water supply of the city. Studies of methods of purifying the water were begun at the Lawrence Experiment Station in 1887, and as soon as the cause

of the excessive prevalence of typhoid fever in the city was ascertained to be due to the river water, the Board recommended that the water be purified by filtration through sand. While there was much skepticism at that time as to the danger involved in using unpurified river water for drinking, the filter was nevertheless finally installed with results that greatly exceeded expectations in its improvement of the health of the city. The filter was built after the least expensive design that it was practicable to devise, and after it had demonstrated its efficiency the city was later on urged to replace it with a more effective structure.

"The history of filtration in Lawrence following the introduction of the filter and the realization of the fact that it had effected an enormous improvement in the health of the city seems a fair basis on which to judge the probable future experience in the continued use of the Merrimack River as a source of water supply for the city of Lawrence. In the course of a few years after the filter had been constructed it became necessary for the Department in 1902 to urge the city to provide additional filtration facilities, but notwithstanding this advice the city neglected to enlarge the filter in season and only by the most extraordinary efforts was the necessity of introducing unfiltered river water into the mains avoided." Stopping there for a minute, would that illustration of municipal experience and dilatory action at all influence your judgment as between a source of supply which had to be pumped and stored and filtered and aerated and chlorinated, in contrast to a better original source of supply, and obtaining it by gravity? A. No, I don't think it would.

Q. You wouldn't take into consideration at all the human element as displayed in the conduct, in this country at any rate, of (1460) municipal affairs? A. I think the human element is, on the whole, more important in these stored supplies than it is in a treated supply, because in such storage supplies as now are used by Massachusetts the safety of the city depends on the efficacy of patrolmen and people who are watching the reservoirs, where there is a far greater element of danger than there would be in the operation of a modern mechanical treatment plant.

Q. What you say about stored waters of the Metropolitan District isn't borne out by any disease statistics that you have, is it? A. No.

Q. Boston's typhoid record is as good as any city, isn't it? A. Excellent, yes, and I think it would continue to be with a more scientific type of treatment.

Q. But the scientific type of treatment, for what it is worth, can be applied just as well to the stored waters of the Metropolitan District as to the polluted Merrimac water, can't it? A. That is what we are proposing to do, store the water of the Merrimac until it is about as pure as the present supplies, and then filter it and chlorinate it.

Q. So that the possible breakdown of the municipal government in this respect wouldn't affect your judgment at all as to where you went for the water? A. I can't conceive of a possibility of breakdown with a 60 or 90 days' storage and the treatment plan here provided.

Q. All right. Now, I will resume what I was reading: "This experience has been repeated time and again in the twenty years that have followed; and even at the present time the filter is inadequate for the purification of all of the water required for the city, and aid has been obtained from the neighboring town of North Andover, the inhabitants of which so reluctantly furnished water to the city on the ground that it would mean that they would constantly be called upon to provide for such emergencies. This fear has been realized and at the present time such assistance has come to be the regular course of procedure in providing the city of Lawrence with an adequate water supply. It thus appears that while the city has continued to use the polluted water of the Merrimac River its inhabitants have been menaced with the danger that unfiltered water would be introduced into the supply pipes, owing to the lack of adequate filtration facilities, not once but many times.

"Speaking scientifically, the question as to whether the city of Lawrence can continue to use the Merrimac River water for drinking must be answered in the affirmative. The river water can be purified so that it will be safe for drinking, so far as disease germs are concerned, even should its pollution become far greater than it now is. But even now the problem of

filtering the water of the Merrimac River is that of purifying one of the most polluted, if not the most seriously polluted, waters used by any city in the United States. *It can be done,* but sanitary science, prudence and economy agree that it *ought not to be done if another source of supply can possibly be obtained.* A water polluted by great quantities of sewage and by chemicals of various kinds discharged in the foul drainage of factories and mills, even though filtered and disinfected, cannot be regarded as a satisfactory source of public water supply. The question of the wisdom of the continued used of this river is one which, in view of the record of the past, admits of only one answer and that is, that under the circumstances the continued use of this water is a constant menace to the health of the people of the city."

(1463) MR. AVERILL. What are you reading from, Mr. Warren?

Q. Now, if such a response were made by the State Department of Health to the inquiry of the City Council of Providence, and that was signed by Eugene R. Kelley, Commissioner of Public Health—

MR. CALLAHAN. Lawrence, you mean.

MR. WARREN. Yes, what did I say?

MR. CALLAHAN. Providence.

MR. WARREN. Yes, Lawrence.

Q. You would think the Commissioner was wrong, if he made such a response, and that the people of Lawrence ought to continue to use that water? A. I think—the dangers are a little overdrawn, but it was essentially those considerations that he mentions that led us to insist on the storage reservoir, which completely alters that picture. It is exactly that fact that I tried to bring out in direct testimony, that while filtration and chlorination, as he says, could get by, could yield a safe water from the Merrimac River, we felt that it was a dangerous procedure and therefore the water should be stored and subjected to a 98 per cent purification before the filtration and chlorination.

(1459) that the illustration of municipal experience and dilatory action at Lawrence in the failure to construct additional filters as recommended by the Massachusetts Health Department in 1902 would not influence his judgment between a source of supply which had to be pumped, stored, filtered, aerated and chlorinated in contrast to a better original source of supply to be obtained by gravity; that 60 days' storage is a reasonable period and, if anything, a little longer than necessary; (1464) that using 60 days' storage for purification, an extra 30 can be used for drawing down; that the storage effects a removal of industrial wastes from gas houses including phenol wastes; (1465) that Lawrence has sometimes experienced odors, possibly due to such wastes in that part of their supply used without storage; (1466) that in his opinion, there are no cities and towns that would reasonably be expected to take water from the Merrimac below Lowell and Lawrence; (1466-1467) that he had not given consideration to what would be the effect of the diversion of 30 percent of the low flow of the Merrimac River upon the water supply of Lowell which gets its water from driven wells; that he hadn't supposed that these wells were located where they would be affected; (1469) that one reason the Metropolitan District should not go to the Ware and Swift Rivers is because, by doing so, they interfere with the requirements of other communities, more specifically those in Connecticut, for water for various purposes, of which water supply is one; that if an actual limitation of water is assumed, domestic use would have the prior claim to water over everything else; (1470) that he knows of no community in Connecticut that would be deprived of Connecticut River water for domestic supply purposes through the diversion of two per cent of the average flow of the Connecticut River by Massachusetts; that he doesn't think there are any such; that he doesn't think the recreational use of the Connecticut River would be interfered with by such diversion; (1471) that he sees no reason to anticipate algæ growth in the proposed Foster-Martin Reservoir; that the diversion of relatively pure

water from streams which will receive pollution below has an effect depending on the amount of diversion; that he would think that a diversion of 30 per cent of the dry season flow was pretty substantial; that he should think on the whole it would be worse for the communities below the point of diversion than the Ware-Swift situation, in which the War Department has required Massachusetts if it makes the diversion, to contribute something to the Connecticut River; (1475) that he had analytical results obtained on four samples from each of the nine Assabet supplies, from the Shawsheen supply, and from the Ipswich supply; (2256) that he did not consider possible future additional increases in population and sources of industrial pollution on the Assabet, Shawsheen and Sudbury Rivers as factors making the waters of the so-called Fifteen Watersheds unsuitable for treatment by filtration; that the fact that these supplies came from thickly populated areas was a real but minor element in judging suitability for treatment; that a large number of typhoid epidemics have occurred on almost uninhabited areas where the sewage from a single farm has got into a stream; (2257) that a limited population is no safeguard; that a considerable population on a watershed is not necessarily a menace; that Chestnut Hill distribution reservoir of Boston, surrounded by crowded apartment houses is much freer from danger of pollution than many remote lakes; that he thinks the only real test is the quality of the water finally delivered as indicated by the methods given by science; that analyses were made of the sources in the Fifteen Watershed plan and showed B. Coli content per 100 cubic centimeters varying from 25 on the Sudbury and 37 on Assabet G, up to 400 on Assabet D, and 412 on the Ipswich; that these can be compared with the standards set up by Mr. Streeter of the Public Health Service who says that for water suitable for treatment by filtration up to 5,000 are permissible; that all of these water supplies are of excellent quality for treatment by filtration and chlorination; (2258) that the probability of further increase of population has been greatly exaggerated; that declining birth rates, increasing death rates in later years of life and the great check in immigration have

led already to a marked slackening of the increase of population that has gone on in the last 50 years; that this country will rather shortly reach a period of stable population; (2259) that along with industrial developments in the future he looks for development of scientific methods of treating wastes, and scientific methods of improving water; that he agrees heartily with Mr. J. Waldo Smith that progress will be made in social comity and in coöperation between states, which is the real way to settle such problems as are involved in the Merrimac and the Connecticut; that he thinks the really sound lesson in regard to this question is to be drawn from the experience of Northwestern Europe where industrial development is on a colossal scale and where water supplies have been taken for 25 years from badly polluted streams running through industrial districts and treated with complete success; that the tendency of the future of this country is toward the more scientific, more intensive use of water resources, "rather than along the line of an attempt to discover the ever-receding gardens of Eden which require no repentance"; (2260) that short circuiting, such as occurred at Lake Owasco, could not occur in the proposed Foster-Martin reservoir; that the Lake Owasco case was a case in which raw sewage was discharged at the surface and being warm and containing fatty material, remained and was blown along as a pool in a single straight direction; that water is to be discharged into the Foster-Martin Reservoir at a depth of something like 20 to 40 feet and taken out at a similar depth; that a change of direction is involved; that any substantial amount of short circuiting is impossible; (2261) that breakdowns in water plants have been rare in relation to the number of plants operated; that they have been either due to flooding, or to break-down of smaller filter plants, or to instances where simple chlorination is used with no other precaution; (2262) that he knew of no instance in the history of public health of the failure of such a plan as is proposed for treatment of the Merrimac River; that the Merrimac River plan provides a triple safeguard; that one of the three elements of the protection might break down once in 10 years; that two of them might break down simultane-

ously once in 36,500 years; that three of them would fail to work on the same day once in 133,000,000 years; (2262) that every well regulated Health Department has its Division of Health Education and one of its chief duties is to produce modifications of public opinion in the line of scientific development, such as immunization against typhoid and diphtheria, control of tuberculosis, regulation of diet, and pasteurization of milk; (2264) that he believes it would be possible to convince the citizens of Massachusetts that the prejudice against the Merrimac supply was unreasonable; that he had examined Mr. Eddy's score of water supplies; (2265) that a water supply is supposed to be satisfactory if its total number of points equals 100; that a total of 91 can be obtained on raw water alone without reference to subsequent treatment used; that population per square mile is the governing factor in the score as any wide variation in that item cannot be overcome by other items; (2266) that water distilled from the Merrimac River or from the Lea River used by London would be penalized 40 to 60 points out of 100 because of the source from which it originally came; (2267) that the Eddy score is of no substantial significance with regard to the quality of a water; (2269) that the population of the United States in general is going to be stable very shortly and that his studies indicated that Massachusetts would not be exceptional in that regard; (2270) that if the ultimate quality of the water delivered were the same, the cost the same, and the relative effects upon other communities were the same, it would be a matter of indifference what the quality of the raw water was; (2271) that the Ware-Swift and the Wachusett supplies are a great deal better to start with than the Merrimac; and that he thinks that the public can be educated to accept water from a polluted source instead of from a pure source, if the polluted water were properly treated.

DR. FRANK E. WINSOR testified (1420) that the Merrimac River is being used and has been used for many years for commercial navigation as far as Haverhill, 20½ miles above the mouth of the river; (1421) that work on the Merrimac River in small portions has been done for many years by the United States Government; that he thinks that the Merrimac River has been considered since very early years as a navigable stream in Massachusetts and southern New Hampshire; that the Secretary of War in 1916 submitted a report to Congress and that this report covers a navigation project which was investigated concurrently by the Commonwealth of Massachusetts; (1422) that the United States Government in 1928 had spent about $905,000 on the Merrimac River for navigation by improving the entrance at the mouth of the river at Newburyport and by providing for a channel 7 feet deep and 150-feet wide up to Haverhill; (1424) that the report printed as House of Representatives Document No. 1813, Sixty-Fourth Congress, second session, and which was forwarded by the Secretary of War, printed January 2, 1917, covers a further investigation for extending the Merrimac River channel as far as Lowell, and in this report it is stated that there is no waterborne commerce on the section of the river between Lowell and Manchester, a distance of about 35 miles, and that the expense of improving this section of the river would not be justified under the conditions existing at the time of that report; that the Commonwealth of Massachusetts, in legislation enacted June 14th, 1914, appropriated $1,000,000 for the improvement of navigation on the Merrimac River from Hunt's Falls at Lowell, right (1425) below the Lowell Dam, by the construction of a channel 18 feet deep and 200 feet wide, provided that this sum should not be available or expended until Congress should approve a project and make an appropriation to improve that part of the river from the sea to a point opposite Ward Hill, Ward Hill being about one mile above the head of navigation at Haverhill; (1427) that the United States Government estimated that the work which would have to be done as its part by the Government would cost $6,-

000,000, exclusive of rights of way, terminals, bridges and some other expenses of that kind, in addition to the $1,000,000 suggested by Massachusetts; (1428) that in a report of the District Engineer of the War Department, it was stated that the interests to be affected were of sufficient magnitude to justify the United States in entering upon the project, providing that Massachusetts pay one-half of the costs and assume other responsibilities; that following the War other investigations have led the Board of Engineers for Rivers and Harbors to report to the Chief Engineer of the United States Army in July, 1923, that the improvement of the Merrimac River from Lowell to the sea was not considered advisable at that time; that the District Engineer made substantially this same statement some two years ago; (1429) that obviously the river comes under the Navigation Act of 1899; that it appears obvious that it is considered as navigable, not only in Massachusetts but also from the Massachusetts State line to Manchester in New Hampshire; that the Vesper Country Club bridge which connects Tyng's Island with the mainland and which was built about 1908, required a special act of Congress; (1430) that he has made no personal investigations or measurements as to the effect of possible diversions of the Merrimac River upon the navigable depth but that it is obvious that diversions will affect navigable depth; (1432) that the traffic in 1928 at Newburyport into Newburyport Harbor, which comes in through the mouth of the Merrimac River, was 59,203 tons with a value of $678,516.; that in that year the traffic on the river above Newburyport amounted to 58,933 tons with a value of $741,421.

(1435) Q. Now, assuming that the War Department applied the principle that it applied upon the Swift River application, during what period, on the average, would it be impossible to make a diversion of 200,000,000 gallons per day? A. If the War Department should make a ruling similar to that which has already been made relative to the diversion of the waters of the Swift River from the Connecticut River, namely, that diversion in the navigation period from June 1 to November

30, should not be permitted except when the flow exceeds 4,650 cubic feet per second at Sunderland, this corresponding to .58 of a cubic foot per second per square mile of drainage area, and that no water should be taken from the Merrimac River at Tyng's Island during 2.6 months in the average year, determined by records of 50 years from 1880 to 1929, there would be .4 of an additional month, on the average, in which only part of the 300 cubic feet per second supposed to be taken from the river would be permitted, thus making only nine months in the year during which the entire divergence proposed could be made, provided that the same rule applied proportionate to the drainage area.

Q. That 300 cubic feet per second that you just mentioned is equivalent to the 200,000,000 gallons per day? A. It is substantially.

Q. Which the Knowles' project contemplated? A. Yes.

(1436) that the proposed diversion of 200,000,000 gallons per day, as proposed, would be about 5% of the average flow of the Merrimac River and under the Knowles-Jacobs' project it is proposed to take 200,000,000 gallons per day—every day.

(1586) X. H. GOODNOUGH, Chief Engineer of the State Board of Health of Massachusetts, called by Massachusetts testified that there are a number of sources south and southeast of the Metropolitan District at Long, Assawompsett and others which are in Middleborough; that the Taunton River is in Bristol and Plymouth counties; that that part of Massachusetts south and southeast of the Metropolitan Water District is self-contained; that he doesn't think it has much of any surplus but that it has enough for present needs for a reasonable time in the future; that there is not any water to any substantial amount or quantity in that part of Massachusetts available for the Metropolitan District; (1587) that this district is south of the Old Colony line, which is the line between Massachusetts and Plymouth colonies; that it runs along down to Rhode Island (1588) to a point a little

south of the northeast corner of Rhode Island; that in 1895 an investigation and report was made by the Board of Health which is contained in House Document 500 of 1895; that he took part in that investigation and was assistant engineer; (1589) that the Merrimac River was investigated and considered; that the Merrimac River was rejected as a source of water supply; that as a result of that investigation the Wachusett Reservoir plan was adopted; (1590) that the Merrimac scheme was about 10% cheaper than the Wachusett plan and that they decided to recommend the Wachusett development to the Legislature; (1591) that the State Board of Health has jurisdiction of the sanitary condition of the rivers and waterways called inland waters in the statute; that the statutes apply to all waters with the exception of the Merrimac and Connecticut rivers and so much of the Concord river as lies within the city of Lowell, and the ponds and streams over which the Metropolitan Water Board has control; (1592) that the reason for the exception of the Connecticut and Merrimac rivers is that they were large rivers; that the Board cannot regulate the pollution on those two rivers except as the people along the rivers ask our advice as to what to do; that we can advise them but they are not obliged to follow it; (1593) that the City of Lynn has the right to take all of the flow of the Ipswich River in excess of 10,000,000 gallons a day just about a mile above the paper mill dam in Middletown; that Lynn is not allowed to take any water in the months of June to November, inclusive; that this is to maintain a proper flow in the Ipswich (1594) River and furnish waters to industries at Ipswich; that an investigation was made by the Legislature for water supply in Southern Essex County in 1911 to 1913; that there were several investigations and one or two by the State Board of Health and one by the Special Commission and that all of the cities and towns near the Ipswich River or its watershed were included in that investigation; (1598) that the next investigation was under the direction of the Legislature and is House Document 1550, Exhibit C-1; (1600) that that is the report in consequence of which the legislation was passed under which the present Metropolitan

Water Supply Commission is proceeding; that he is familiar with the Ware and Swift Rivers; that both rivers are entirely within Massachusetts; that he is familiar with the site of the proposed Swift reservoir and that that site is very advantageous for a reservoir; that it is large and would be (1601) deep; that the advantages of depth are the great improvement in quality of the water in storage and that in a season of shortage of water plenty of warning is given; that the site has almost no population or will have almost no population on the watershed; that the population today is very small and has been growing smaller for 70 years; (1602) that the site is the best site in Massachusetts for a reservoir; that the Ware and Swift supply as modified by the War Department will be sufficient to take care of the Metropolitan District until 1970; that at that time if the estimates of population are correct it will be necessary to obtain more water for the Metropolitan District; that by 1970 it is believed that a new water supply will be needed; that it is impossible to answer from where it will be gotten at that time; (1603) that there is more than a possibility that there may be some combination between cities and power companies for building great reservoirs, which will be used to their mutual advantage; that that is being done now; that there is such a plan being carried out now in Springfield; (1604) that it is impossible for him to say now where additional water is going to be sought; (1605) that if the additional water is going to be taken in western Massachusetts, he thinks that the Swift River is the best place in which to store it; that as far as present appearances go, it is possible to take the freshet flows of some of the other streams in the Connecticut Valley; that there are plenty of streams all through New England, especially in the Connecticut and Merrimac valleys, that would be used in connection with this reservoir; that he would not say that there is a probability that the streams in the Merrimac valley would be diverted into the Swift reservoir.

He further testified that he is somewhat familiar with the so-called Metropolitan Water Supply Investigating Commis-

sion, reported in House Document 900 of 1926, Exhibit C-2, that the engineers were Allen Hazen and Leonard Metcalf; (1606) that in this report Mr. Hazen recommended nine little reservoirs on the Assabet River watershed; that the Assabet River was considered in the 1895 report by Mr. Stearns, who said that it was possible to take certain small areas in the upper Assabet watershed and divert them into the Wachusett-Sudbury tunnel; that this is practically the same thing that Mr. Hazen suggested and that Mr. Jacobs has suggested; that the 1922 report mentioned the Assabet River and the possibility of taking certain watersheds there but did not recommend them; (1607) that in his report he said that they might get somewhere from 11,000,000 to 17,000,000 gallons a day out of it but that it was not advisable to take it; that it was a very small amount and that the diversions better be left for use as emergency supplies; that that is still his opinion except that diversions have to be made only at the times of very high flows, or else there will be trouble down below; (1608) that in order to make these diversions from those little watersheds, all of the works that Mr. Jacobs' plan shows, or some equivalent, would have to be put in if they were going to be used except the ones coming in by gravity; (1609) that if anything like 35,000,000 gallons per day were to be obtained all of the works that Mr. Jacobs recommended would have to be put in and that without using the pumps and the works, somewhere between 11,000,000 and 17,000,000 gallons per day could be obtained; that the Assabet is polluted; that it is one of the streams that the State Board of Health controls; that about thirty years ago one of the rivers of the state became very seriously polluted—the Neponset river; that the State Board of Health was asked to advise the legislature what to do; and they told the legislature that a more strenuous control, a stronger control, was necessary in the case of that river; and the legislature passed a law which enabled or directed the State Board of Health to prohibit the discharge of sewage into the river and to prevent the entrance of manufacturing waste unless it had been treated and purified, and directed the Board to advise the cities and

towns and persons as to how to purify; (1610) and very strenuous legislation was passed; next we had trouble with the Aberjona river in the north part of the district; and in 1914 the legislature passed an act directing the State Board of Health to prohibit the entrance of sewage or manufacturing waste unless treated, into the Assabet and to prevent the entrance of any other substance which might be injurious to public health or tend to create a nuisance, and specified how the report should be enforced; that he has a table showing the pollution in the Assabet and that he thinks none of it is above the proposed sources of withdrawal shown in Mr. Jacobs' plan; (1611) that if you remove the good water on the upper watershed, the tendency will be to increase the effect of pollution discharged into the river below, because of the lack of dilution; that Mr. Jacobs' plan providing for letting down 3,000,000 gallons a day would not be enough to take care of this pollution, because in all probability the flow of the river would be reduced still more materially and would have a tendency to increase the objectional conditions in the river; that they have done their very best to clean up the pollution but the reason that they cannot succeed is that they failed on the Neponset and Aberjona Rivers and have been obliged to have (1612) a sewer built up the whole length of the valley—in spite of all the treatment they could make; that this sewer is an intercepting sewer; that the purification plant broke down because it is very difficult to treat some of the wastes and that the best of treatment is not a purification in most all cases. There is always trouble in maintaining the works. Towns and factories neglect their work and it is very hard to keep them up; and our attorney general has told me that it is useless to go to court with some of these complaints because they are doing what he thinks is the best they can. Treated or purified sewage contains always a large amount of nitrates, which can create plant growths in the river; (1613) that they have many difficulties with filtration works; that sometimes the manufacturers put in wastes which puts the works out of business for a while; that doing their best, they are unable to secure satisfactory purification in the Neponset and Aberjona Valley and that he

fears they are going to have similar troubles in the Assabet and that he is sure that they would if any material quantity of water is diverted from it; that the proposition of diverting water from the Assabet was before the Legislature on the Hazen report; that he attended all or most of the hearings; that there was strong opposition before the Legislative Committee to taking any water from the Assabet River, the opposition being on the part of the inhabitants of the valley and of the Concord River valley and of the City of Lowell, through which the Concord River runs; that the Assabet runs into the Concord and the Concord runs into the Merrimac at Lowell; that the Assabet is highly developed industrially; that the Concord is in very flat condition to North Billerica and from there it is highly developed through to its mouth; that the industries in Lowell used to take a large amount of water in their processes but that he has not looked at them in very recent years; (1614) that some of the factories on the Assabet use great quantities of water in the manufacturing processes, the chief of which is the American Woolen Company's mill at Maynard, which apparently discharges in its waste, objectionable waste, 2,000,000 gallons a day, which is two-thirds of the amount of water which Mr. Jacobs was going to let down to dilute the river; that the State Board of Health requires 2,000,000 gallons a day to be treated by the American Woolen Company; that it is not pure after treatment; that it is his experience that whenever this effort is made to purify streams which are industrially developed (1615) somebody has to build an intercepting sewer; that in 1924 a plan was made to get rid of the sewage on the Merrimac river from Tyngsboro to the sea, and that they considered the alternative of putting in sewage disposal plants for each separate town, and for groups of cities and towns, sewage treatment works; that to build an intercepting sewer along the Merrimac river would cost about $20,000,000; that the project of building an intercepting sewer along the Merrimac river was considered because of the objectionable conditions complained of in that river below Lawrence and Haverhill down to the tidal portion

of the river several miles below Haverhill; that these objectionable conditions arise from (1616) the great pollution of the river by sewage and manufacturing wastes throughout its length; that if one-third of the low river flow above Lowell of the Merrimac river should be diverted by the Metropolitan District it would probably bring about the immediate construction of a sewage system or sewage disposal works, whichever they chose to build; that this would be an inevitable consequence of the diversion; (1619) that his opinion as to the desirability of the Assabet supply for the Metropolitan District, as outlined in Mr. Jacobs' project, or as outlined in Mr. Hazen's project, is the same as it was in his report in 1922; and that a little of it at the upper end that can be used by gravity is usable as a temporary supply in case of emergency; that in his opinion there is not a sufficient quantity of water to make it (1620) worthwhile unless it is confined strictly to the highest freshet flows; and it is of mighty little advantage except as an emergency supply; that the emergency supply would be eleven to seventeen million gallons per day at the outside; that the Merrimac river, as suggested by Mr. Jacobs, is in his opinion an objectionable supply for the Metropolitan District because it is beyond the police control of the state; that we know from experience that the state would have no chance to prevent pollution of any kind; (1621) that the Merrimac River comes into Massachusetts two or three miles above Tyng's Island; (1622) that from that point north is wholly within the state of New Hampshire; that he has navigated the Merrimac River from Haverhill to the sea; that it has been kept open for navigation at Lawrence; that there is a scheme lately for developing the Merrimac River as a waterway from Lowell to the sea; that the War Department has taken some part in it; (1623) that the question of navigation bears upon taking water from the Merrimac River because the river is very shallow below Lawrence and near Haverhill; and that he thinks lowering the water in the river would injure navigation; (1624) that the diversion of two hundred million gallons per day from the Merrimac River would reduce the

power in Lowell; that the reservoir of the Ipswich River proposed by Mr. Jacobs is substantially the same site proposed by Mr. Hazen, near the Salem turnpike; that he knows the site very well; (1625) that the reservoir proposed by Mr. Jacobs would be raised over what is known as the Wenham swamp; that he has examined that swamp in times past, and that it is a deep deposit of muck; that the greater portion of the reservoir would be a muck meadow; that from the standpoint of its availability as a reservoir the muck meadow would be likely to create a nuisance in two ways if used for a water supply: first, by the organic matter furnishing food for organic growths; and also by the presence of excessive organic growths; that he has known of organic growths in a reservoir in Massachusetts under similar conditions from which the odor was so intense that it could be smelled one-quarter to one-half a mile away; that when the reservoir is drained down very offensive odors will be given off from the exposed bottom; and that that is one of the chief causes of nuisance that is encountered in the summer and autumn seasons in this state; that the reservoir from which the offensive odors came, and which he mentioned above, is the Ludlow reservoir at Springfield; (1628) that the population in the Ipswich watershed is increasing very rapidly, as well as in the Shawsheen and Concord watersheds; (1629) that it is the policy of the Commonwealth to first provide that towns in another watershed shall first be provided for before water is taken for the Metropolitan District; that at Springfield, where Springfield took water from the southwest branch of the Westfield River, the law provided that if the flow of the river was not sufficient to dilute the sewage of Westfield that Springfield should build a new system of sewage disposal; (1630) that at Clinton the Water Board was required to construct a sewage disposal plant for the town of Clinton, and to maintain it until the town had grown to the point where the river would not care for its sewage; (1631) that there is a Massachusetts statute which requires the Metropolitan Board to build a larger sewer or to make other provisions for the disposal of the sewage of the city of Marlboro; that in the

Hazen-Assabet plan there was a compensating reservoir provided (1632) for the purpose of maintaining the flow of the river in dry weather, during the dryer six or eight months of the year, to a point which would be as high as it would have been if no water was taken; that the purpose of this compensating reservoir was to take care of the mills down the river; that in his opinion, if thirty-five million gallons were diverted from the upper Assabet and its tributaries, something of that sort would be essential; that he considers that the attitude of the public as regards the source from which their water supply is to be taken is a legitimate element for consideration in selecting a source; (1633) that that is a very strong element; that the people of Lawrence have objected most strenuously to the further use of the Merrimac River, to his knowledge, for twenty or twenty-five years; that there has not been any serious suggestion, before this one of Mr. Jacobs, that any city or town in Massachusetts in the Merrimac valley (1634) should take this water supply from that river; that it has never been thought they should go to the Merrimac River itself; that the Lawrence water is filtered; (1638) that the Metropolitan District has steadily had a tendency to go further west for its water supplies; that the reason for that is that they could get purer and better water in the higher regions and less inhabited regions in the central part of the state than in the immediate region east of the divide; that the fact that the Metropolitan District has been growing very rapidly and spread out so in later years, consequently overflowing into the adjacent watersheds, has accelerated and promoted the tendency to go to the west for water supplies; (1639) that in his opinion the public in the Metropolitan Water District would object very strenuously to the suggestion that the water for the District be taken from the Merrimac River; that the State Board of Health would consider it was a danger to the public health; that the legislature would consider it was a danger to the public; and that all the prominent citizens, in his opinion, would be against it; that this is a very important element for consideration in determining on a water supply

and is one which must always be considered most carefully; (1640) that it is his personal opinion that the Merrimac River is a very objectionable water supply for the Metropolitan District; that he thinks that if it was used that there are many people who would not drink the water; that he has heard the people of Lawrence beg the legislature year in and year out to find them some water supply so that they could get rid of using the Merrimac River; that he feels that they don't want it under any circumstances because of the sewage pollution above; that the sewage pollution is all through the river in New Hampshire and in Massachusetts; but that an enormous amount of it is in New Hampshire; that there were between four hundred thousand and five hundred thousand people in New Hampshire whose sewage drains into it; (1731) that there is one large industry on the Shawsheen River, the American Woolen Company; (1734) that in his opinion the Shawsheen is objectionable as a source of water supply for two reasons: one is, that there is a very large amount of swamp in the valleys and if reservoirs were built there they would be very expensive, or if the swamps were cleaned out they would be objectionable when the bottoms were exposed; and also the quality of the water would be objectionable; the chief objection, he thinks, is that the growth in the upper part of the watershed has been very rapid in the last few years; (1735) that Mr. Jacobs suggested in connection with the Fifteen Watershed Project, that a reservoir should be built on the Shawsheen, from which water should be pumped over the divide so that it might go into and increase the flow or supply in the Ipswich; that in his opinion this is objectionable on account of the pollution; the water is going to be very poor; and with a growing population trouble will result from reservoirs being drawn down; that that thing was fought out for years; that three or four times in the legislature years ago, the city of Boston tried to get the Shawsheen and was denied every time; that that was back between 1876 and 1886; that the Fifteen Watershed Project contemplated (1736) increasing the supply of water to the Metropolitan District by pumping water from the lower Sudbury to the Hobbs brook reservoir and thereby increasing the capacity of

the reservoir; that that was proposed by Mr. Hazen in House Document 900, but that he did not recommend it; that that is another region which is growing fast but that the difficulty with it is that the sewage disposals of Framingham, Natick and Marlboro were diverted out of the upper Sudbury watershed and is all disposed of inside that North Sudbury watershed; (1737) that there is also a considerable amount of manufacturing waste in the town of Framingham; that the river is very badly polluted for the six miles below Saxonville, which would be above the point of taking; that he thinks that the Shawsheen would be a decidedly objectionable source; that he does not believe that any of the departments would seriously consider the use of the lower Sudbury (1738) from the standpoint of public health, based on the pollution of the water and its general conditions; that even though the water were filtered and chlorinated, the probability is that the water would be objected to by the people who didn't want to drink polluted water; that they have tried that out many times and that the people are always of that opinion, as far as he could see; (1739) that he figures that the quantity required by the communities in or easily accessible from the Ipswich watershed in about 30 years will be about forty million gallons including what they take there now; that Essex County, which has an area of about 497 square miles and a population of about 500,000, together with the adjacent district in Middlesex County, is likely to want water there, and that the Ipswich is the only available source; (1740) that it is a very hard problem of water supply for the Ipswich communities because the amount is limited and the quality poor; (1741) if the cities of Salem and Beverly do not go into the Metropolitan District they will need the Ipswich water; that, from the standpoint of the present Metropolitan District, with such places as may be expected to come in, but excluding this Ipswich River group, there would be no real surplus of water for any great length of time for that district from the Ipswich River; (1742) that the towns along the north shore between Lynn and Gloucester are growing in population; that the towns are prosperous;

that that region is growing as a residential community; (1743) that there is a very large summer population along the coast and a tremendous summer population in Salisbury, the extreme northerly town against the sea; that there are excellent motor roads connecting that territory with the city of Boston, and that this has encouraged people to live there all the year round to get away from the city; that the town of Wilmington in the middle of the Ipswich watershed has increased 50% in population in the last five years; that this has a double effect on the water supply; it makes more people take the water and makes the water less desirable to take; that it makes a serious problem for the engineer of the State Board of Health to keep the (1744) river clean; (1744-A) that the following quotation at page 158 of House Document 1550 expresses his opinion today:

> "The Ipswich River and its tributaries are now used as a source of water supply by the cities of Lynn, Peabody, Salem and Beverly, and by the towns of Danvers, Saugus, Reading and Middleton. If used by the Metropolitan Water District, in addition to the municipalities which now take water from it or are likely to require water from this watershed in the future, there might be a small quantity of water remaining for the use of the Metropolitan Water District for a short time, but the large and rapidly growing municipalities in the part of the state in which it lies require that this watershed should be developed for their uses alone, and that this source should be kept for that purpose;"

(1745) that sometimes the state board of health recommends the use of filtered water, but that, if the people don't want it, the Department doesn't recommend it; that from his standpoint this water is not suitable for the Metropolitan District because the Metropolitan District doesn't want filtered water; (1746) that the trouble with filters is that, with these very soft waters, it is very difficult to filter the water and not make it corrosive; that it corrodes the pipes; that that is true even though there is storage first; in Cambridge the water is stored and filtered at present, and is very corrosive; and the

water, if it is corrosive, causes lead poisoning; that there was a very great epidemic of lead poisoning in Lowell some years ago; and that this was a lesson against taking corrosive waters; that by making the water harder this corrosiveness can be corrected (1747) but that it makes it very objectionable from a public health standpoint because people object to the hard water; boiler men object to it; (1749) that Lowell should be added as a possible addition to the Metropolitan District; that this will come, he believes, from a conduit from the Wachusett reservoir running right down there; that that has been planned and investigated; that a conduit from the Wachusett reservoir has been planned right down through to the Merrimac River watershed; that there is a stream called the Salmon brook which can be developed, and some of the upper waters of the Nashua River; (1750) that this is an interstate stream and flows from Massachusetts into New Hampshire; (1753) that in one case there is a mechanical filter in use where the hardness of the water was increased from two or three parts per million to ten parts per million; (1754) that the increase in hardness can be regulated scientifically by putting lime in; that the state board of health has recommended filtering time and time again where it is necessary; but the trouble is that the towns and the cities don't care (1755) to accept it; they say they want a water that is unfiltered; a great many of them say they don't want a water with "dope" in it; that is their expression; that they cried out very strenuously in 1926, when the matter came up in Mr. Hazen's plan for a water supply, where he proposed to filter the entire water supply of the Metropolitan District, and it was canvassed for three or four or five months in the legislature and absolutely rejected because they didn't want filtered water; that the policy is based on what the public demands,—and to get upland water which is relatively pure, rather than river water that requires considerable treatment; that the popular demand is always for clean water; that in his experience the legislature reflects and voices that very real public attitude regarding water supply in the Commonwealth;

that a water which had been stored for sixty days even, from the Merrimac, then filtered (1756) and chlorinated is always a menace; (1757) that after it has gone through that process he would not say that it is not fit for human consumption; that you can purify sewage so that it can be drunk; that, from the public health standpoint, water which went through that process would not be condemned as being unhealthy if it was properly done; that the water can be purified; that there is a danger of something breaking down in the purifying process; that there was an example of this in Lawrence some years after the filter was built when the filter broke down, causing polluted water in the city, resulting in quite a number of cases of typhoid fever; that, in the southern part of the state, a small filter was put in a village by an excellent engineer, but that it fell into hands that didn't understand it and the water ran though without any purification; (1758) that in Cambridge a filter broke down recently and was out of use for some four or five days, during which the people used raw water; that storage tends to purify water quite a bit; that it is possible to get a good deal of purification in a short time when the circumstances are right, but that it all depends on circumstances.

A. X. DOOLEY, a Witness from Massachusetts, testified (1659) that he had been a resident of Lawrence since October 1901, and all the rest of his life he had been a resident of Methuen, a suburb of Lawrence; that in 1915, he was made a member of a Water Supply Commission which was charged with finding a new source of Water Supply for the City of Lawrence; (1660) that at that time the Merrimac River was the source of a water supply for the city of Lawrence; that his commission employed Mr. Morris Knowles of Pittsburgh to make a study of the various proposed water supply projects; (1661) that this report recommended the taking of Bartlett Brook, a tributary of the Merrimac River; that this proposition was not approved by the State Board of Health

because the auxiliary supply of Bartlett Brook came from the waters of the state over New Hampshire line; that his commission was directed by the City Government to find a supply other than the Merrimac River because of the public feeling with reference to drinking Merrimac River water.

(1661) "Why were you so directed, do you know? A. Because of public feeling with reference to drinking Merrimac River water.

Q. What was that public feeling? A. Well, they knew the pollution of the water and they didn't like the smell and taste of it. They knew that almost all the towns on the Merrimac River above Lawrence dumped their raw sewage into that river. They knew that ten miles up the river from Lawrence the city of Lowell, a population of about one hundred thousand people, were pouring their raw sewage into the Merrimac River, and that was coming down to Lawrence in flood time in two hours.

Q. Now, Mr. Dooley, was there any aversion on the part of the public of Lawrence to drinking that water aside from the taste and smell of it? A. Well, yes, they had the aversion that they knew what the water was; they knew the Merrimac River was a public sewer and they objected to drinking sewage.

Q. And it was as a result of that public feeling that this Supply Commission of which you were a member was appointed, is that right? A. Yes.

Q. What about the sale of spring water in the city of Lawrence from the time you were made a member of this Commission up to the present time? Can you tell us anything about that? A. Well, in what way?

Q. Well, is there a large sale of it or a small sale or how does it compare with other cities? A. Just the same as it was for a number of years before this Commission was appointed. It is a very large sale, out of proportion with the sale of spring water in other places elsewhere that we had investigated.

(1663) Q. Do you know of your own knowledge whether or not spring water is used in any of the public buildings or domestic—or homes of the people of Lawrence? A. Yes, I do.

Q. To what extent is it so used, as far as you know?

A. Well, go into the courthouse up there, and you will find a bottle of spring water in every courtroom. You will find it in the Registry of Deeds, you will find it in some of the offices in the courthouse. If you go into the District Court you will also find spring water there.

MR. HOLDEN. You mean a bottle such as we have here in the courtroom, do you, Mr. Callahan?

THE WITNESS. Similar to that.

MR. CALLAHAN. I don't know. Is that what you mean, Mr. Dooley?

THE WITNESS. A tank similar to that, and it is spring water that it has in it; it is purchased from these water vendors.

Q. How about the schools? A. I haven't been in the schools myself. I haven't been in the schools to see them.

Q. So you don't know of your own knowledge as to that? A. Not of my own knowledge, no.

Q. Do you know anything about the proportions of spring water that are used in Lawrence in any year since you were on this Supply Commission? A. Yes.

Q. As compared with the total amount of water used? A. Yes.

Q. What can you tell us about that? A. In the year 1916, for instance, those statistics were gathered and it was then found that the amount of money paid for spring water by the (1664) people of Lawrence in that year was 55 per cent of the total amount of money paid to the city of Lawrence for public water for all purposes.

Q. That is, including bathing and washing purposes? A. And industrial pruposes.

Q. Have you any figures for any other year as to percentage? A. No, that was the year of Mr. Knowles' report, and it is the last year that we gathered them.

Q. How about the public feeling that you have described, Mr. Dooley, with reference to the aversion of the public to using that water? What is the present public feeling up there? A. Well, there is an index of

that apparent by the use of spring water right up to date. Water is delivered in almost every house in Lawrence for drinking purposes, much the same as milk is delivered there.

Q. Do you know what it costs? A. At the present time eight cents a gallon; that is, for anybody who buys one gallon. If an institution buys a larger amount, I think they get it at a lower rate.

(1665) Q. Do you think it is a fair statement to say that as far as the citizens of Lawrence are concerned their aversion to the use of that water is as great as it ever was? A. For drinking purposes, yes.

Q. (By Mr. Averill) However, you have not made any survey of the spring water since 1916? A. I have not.

Q. Does one company supply all the water? A. No; there were 15 different companies at that time, and I think there are about the same number today.

Q. Do they do any advertising? A. Yes.

Q. Have you seen any spring water used in Boston? A. I don't know whether it is spring water or not. I have had water in Boston.

Q. Do they have the same kind of bottles in the public buildings here? A. It is a glass bottle. I think as a general thing it is not the color of that glass (indicating bottle in the hearing room), and I think it is shaped a little different.

Q. You have not found this water supply yet? A. We have not found a water supply that would be adequate and the source of which would be in Massachusetts, and we could not get the approval of the State Board for taking water outside of Massachusetts. That was the unfortunate thing with Lawrence. There is an abundant supply north of Lawrence, but it is all in the state of New Hampshire. (1666) I might say further that there was a recommendation made to us to take the water from Salmon Brook, and our taking would have been in Dunstable, but Lowell made an objection to that. They said they were nearer to that resource than we were and, for that reason, they claimed they had a prior right to it. Besides, the State of New Hampshire was threatening to raise trouble because it would interfere with the water power of the Nashua.

MR. CHARLES D. HOWARD, an expert witness for Massachusetts testified (1645) that he is Chief of the Division of Chemistry and Sanitation of the Board of Health of New Hampshire; that incidental to his duties in connection with the control of water supplies in New Hampshire he has obtained considerable information with regard to stream pollution; (1647) that the unwritten or understood policy of the State of New Hampshire with regard to the treatment of waste has been to the effect that the communities shall not be burdened with the expense of sewage treatments so long as the sewage can be discharged without creating an offense; that there is no existing treatment of industrial wastes on the Merrimac River or any of its tributaries in New Hampshire; that there is no statute which requires such treatment; that the state of New Hampshire has not adopted any policy of requiring treatment or sewage works as far as streams are concerned; that in the case of lakes which are a potential source of water supply, there is control over them; that there is no treatment in any case of sewage which is discharged in New Hampshire into the Merrimac River; (1648) that the City of Franklin takes water and its water supply from a tributary of the Merrimac River; that the treatment given this supply is plain sedimentation but no coagulation, slow sand filtration and subsequent chlorination; (1649) that in a recent case where it was proposed to take water from a stream which had less pollution than the Merrimac, and with filtration, his board advised against this very strenuously, which (1650) amounted to the rejection of the proposition; (1651) that acting on the advice of the State Board of Health, bathing was prohibited in the Merrimac River just above the City of Concord; (1653) that so far as he knows, only one industry on the Merrimac River uses the water for manufacturing purposes and in that case, they do take water from the Merrimac, filter it and use it for boiler purposes, toilet flushing and, as was discovered, for use in their toilet rooms, for the use of their employees; that when that fact was learned, he required that in addition to filtration this water should be

chlorinated, which is now done; that his estimate is based on the experience gained in the course of his duties as Chief of the (1690) Division of Chemistry and Sanitation, New Hampshire Board of Health; that he has occupied the position of chemist of the Board of Health for the last 25 years; (1691) that his general knowledge is gained by investigations and observations that he had made in regard to the stream flow between these various points where sewage is deposited in the river; (1649) that to a greater or less extent he knows that all of the villages (1696) situated on the rivers, discharge their sewage into the river, and that he does not know of any better information regarding this matter than he has given today.

PERCY R. SANDERS, a witness offered by Massachusetts, testified (1697) that he had been Superintendent of the Concord (New Hampshire) Water Works since 1907; that he was familiar with the general sewage of water supply in and about Concord and in a general way throughout New Hampshire; (1698) that he regards the Merrimac River as the last place that the City of Concord would go to for its water; that this opinion is based on the population above Concord in the cities and towns, the sewage of which enters the river; that no person in Concord has any desire to drink water that is obtained from the Merrimac River; (1699) that an investigation of all possible sources of water supply of Concord was made by Metcalf and Eddy of Boston; that this report says: (1700) "Although the water of the Merrimac is abundant in quantity, it is polluted and would require treatment in a modern water filtration plant in order to use the supply for a municipal supply. The cost of the construction and operation of such a plant, together with the objection to the source, make this scheme undersirable;" that this report recommended the taking of water from an upland stream with a population of about 20 per square mile; (1702) that he finds storage to be very successful in removing bacteria; that storage and chlo-

rination are good things anyhow; that the water of the Merrimac could be filtered and used if you had to.

WILLIAM F. SULLIVAN, a witness for Massachusetts, testified (1703-1704) that he is mayor of the city of Nashua, New Hampshire, and president of the Pennichuck Water Works, a private company supplying the city of Nashua; that the present water supply of the City of Nashua (1704) is from ground water of flowing wells on the banks of Pennichuck Brook; (1705) that he does not believe the citizens of Nashua would desire or want the Merrimac River as (1706) a source of water supply, even though it were filtered and treated; that (1708) he does not know of any project to treat any of the sewage of the City of Nashua before going into the Merrimac River.

> (1709) "Q. Do you know what the public opinion is in Nashua, with reference to the general subject of treatment of sewerage or industrial wastes? A. They have no real atitude of mind towards it. We simply, like the rest of New Hampshire, I say, believe, are willing at this stage of industrial New England to favor industries as much as we can. We give them all the permissions and make it as light as possible for them to operate.
>
> Q. And that would mean that there would be no tendency to require them to treat industrial wastes or sewerage? A. Not at the present time."

MR. SAMUEL HOAR, a witness for Massachusetts, testified (1710) that in connection with the hearings in the Legislature on the so-called Gow report, House No. 900, Exhibit C-2, he represented the town of Concord and a woolen mill; (1712) that the town of Concord passed the following resolution:

> "Voted that the inhabitants of the town of Concord in town meeting assembled, hereby protest to the Massachusetts Legislature against the passage of that part

of House Bill No. 900, which in substance provides for Boston's future water supply: And further protests against the taking of all the water from the Sudbury reservoir in Framingham except one and one-half million gallons per day; because they believe that such taking on the Assabet and Sudbury watersheds will reduce the normal flow of these rivers to such an extent that serious damage to health and to property in Concord will result therefrom."

that this resolution was passed by a unanimous vote; (1713) that the people of Concord were concerned, because they felt that to interfere further with the flow of either one of these rivers would be a very serious detriment to the public health of Concord; that many of the people who had property on the river front felt this taking would be a serious damage to their real estate; (1714) that the compensating reservoir proposed was not acceptable to the people of Concord; that the Talbot Mills felt (1715) that the proposed taking would so reduce their water power that unless the mill went to steam power, it would have to go out of business; that the process water which the mill obtains at present is so dirty that any lessening of the flow would make it so much dirtier that it could not be used; (1716) that the sentiment of the Town of Concord would be the same today if a taking of water supply were proposed from the Assabet River for the Metropolitan District.

GEORGE A. BATES, a witness called for Massachusetts, testified (1761) that he is Mayor of Salem, that he is Chairman of the Ipswich River Protective Association, which was organized at the beginning of 1926 to protect the water supply needs and availability for the cities and towns of Essex County, to protect it against anyone who wanted to go in and take it away from them; that the water supply which the Association sought to protect was the whole watershed of the Ipswich River; (1762) that the cities of Salem, Beverly and Peabody and the town of Danvers, and many other towns in Essex County, are

today and have been for many years very badly in need of an additional source of supply; that if the source of supply that they had available by their natural rights and heritages was taken away from them, it would mean that they would have to go elsewhere for a water supply; that Wenham Lake is the only storage basin for the city of Salem, together with the Longham basin, which adds to it; that they are given the right under the statute to tap the Ipswich river during the course of the year for an additional supply and that they avail themselves of that right; that about a month and a half ago the lowest point in Wenham Lake since 1910 was reached, and that the situation there is really serious; that something definite must be done in order to bring about better water supply conditions for these cities; (1763) that the Hazen report contemplated going down into the Ipswich river valley and taking that source of supply for the Metropolitan District; that in Essex County the public was so aroused over the fact that the Metropolitan District contemplated taking their source of supply, that they immediately organized a fighting protective association, believing that the Ipswich river ought to be available for the cities and towns in Essex County, and because they were not altogether well informed by any study that had been made in the past that there was any available water for anybody outside; (1764) that as a result of that feeling a committee was organized of which he was elected Chairman, and that his recollection is that ninety to one hundred representatives of Essex County cities and towns went to the meeting; that they protested the passage of such legislation as was embodied in the Hazen report, and filed a resolve in the legislature asking for a further study of the situation; that the result of this was that they were excluded from the bill which eventually passed the legislature; that, as mayor of Salem, and as Chairman of the Protective Association, he was in a position to find out what the public's sentiment prevalent in Essex County was; that the public opinion in Essex was very strongly opposed to anyone else taking the water of the Ipswich river; that it was a very rational sentiment of men who were well

informed, and who believed that water which they needed for their own use was being taken away from them and they were being forced into something else that they didn't want to go into.

JOSEPH A. MC CARTHY, (1765) called by Massachusetts, testified that he was assistant at the Lawrence Experiment Station of the Massachusetts Department of Public Health and has been at Lawrence in that capacity since 1910 with the exception of the war years; that the purpose of that Station is to experiment on sewage purification in order to advise cities, towns and individuals; (1768) that about 1920 they put in operation there a modern mechanical filter which was a very complete modern plant with an area of .0001 of an acre for filtering Merrimac river water; that in 1922 and in 1924 they were unable to obtain satisfactory coagulation, and consequently to filter the water in the mechanical filter; that it is necessary in the use of a mechanical filter to coagulate the water; (1769) that coagulation collects inseparable particles of suspended matter, and to a certain degree, the bacteria, and clumps them into larger particles than their original condition; that it reduces the turbidity of the water and confines it to a small part of the influent water; that at the time when the satisfactory coagulation was not obtained, they tried to filter the water thereafter with unsatisfactory results; that the water which they tried to filter was not good; the color was high; there was turbidity and (1770) that, after a few hours, a precipitation would become evident; (1771) that these unsatisfactory conditions were found in the spring during the freshet conditions; that some of these unsatisfactory periods lasted, roughly, two weeks; that one lasted eighteen or nineteen days; that they had on a model scale every device that was known to be in public use at this time; that after the water went through the filter plants during these freshet conditions, it was not satisfactory for domestic purposes; (1772) that ordinary slow sand filtration could have been used on

such a water and that that would have taken care of it, but that forty or fifty or sixty times as much filtration area is required for slow sand filtration as for mechanical filtration; (1774) that outside of this experimental test his experience with rapid sand filters was during the war in France when he helped to construct and operate filters; that they were just about coming to a successful point when the war was over; that there was no reason why they couldn't have been a success if they had had a little more time; that during the tests the number of B. Coli per cubic centimeter of river water without the sewage (1775) ran between three thousand and ten thousand; that with the sewage added it ran as high as one hundred thousand; that he cannot tell what the average would be but that it would probably be around forty three thousand; that after going through this rapid sand filter the B. Coli per cubic centimeter of river water would be reduced from sixty six hundred down to about twenty or thirty; that these figures are average over the entire year of operation; (1776) that with forty three thousand B Coli content, with the sewage added the reduction after filtration would be down to ten to one thousand; that it would average thirty three B. Coli per cubic centimeter after filtration; that with enough chlorine this filtered water could be made safe bacterially.

Q. Have you conducted any experiments up at your station as to the quality of various waters from different water supplies? A. Not to any great extent, on account of the impossibility of getting sufficient supply of water to the station.

Q. Do you remember that some time in 1926 that you examined up at your station about eighty public supplies, including that of the Metropolitan District? A. Yes.

Q. Do you recall that from certain of these supplies, and I am reading now from the annual report of the Department of Public Health of the Commonwealth of Massachusetts for the year ending November 30, 1926:

"In certain of these supplies samples have been taken frequently during the year, but from others only oc-

casionally. Of the 207 samples of the Metropolitan water and impounded surface water, 90 per cent were of the required quality."

Is that correct? A. If it is there, it is undoubtedly so.

MR. WARREN. The question was whether you made experiments and whether that is the result?

THE WITNESS. Of course, I probably made the bacteriological examinations of those supplies.

Q. "Of the Lawrence supply, a polluted river water, filtered and then chlorinated, 702 examinations were made and 91 per cent passed the standard?" A. I should say that was it, yes.

Q. So that the Lawrence was one per cent higher than the Metropolitan District water. Can you tell me anything about the difference in cost below slow sand filters and rapid sand filters? A. I am not an engineer. I can't tell you anything of costs, except as we have them at Lawrence.

Q. All that you can practically say is as to what the tests showed you usually up there? A. What our small filter showed at Lawrence.

N. LEROY HAMMOND, a witness for Massachusetts (1821) employed by the Metropolitan District Water Supply Commission, as Division Engineer at Enfield, Massachusetts, testified that under the direction of Mr. Winsor, Chief Engineer of the Metropolitan District Water Supply Commission, he recently made certain soundings in Wenham Swamp, which underlies a large portion of the proposed Ipswich Reservoir, shown on Exhibit C-32; (1822) that the "dam site proposed by Jacobs 1930" at Willowdale is in the northeasterly corner of the Exhibit; (1823) that the soundings were made with one-half inch iron rods at various points shown by figures on the map, and that the figures represent the depth in feet of soft material and peat found by the witness; starting at the shore of the upland, as indicated, depths from two to four

feet were reached; thence going westerly to a short distance west of the brook shown on the map, a depth of 12 feet was reached; thence northerly in the vicinity of two brooks shown on the map, a depth of 22 feet was reached; thence extending northwesterly a depth of 28 feet was reached in soft material; thence northwesterly along the brook, a depth of 27½ feet was reached; that as they approached the river the water became deeper and the area became inaccessible; that the soundings were limited to those shown on the map; that from the progress of the soundings which he just described, and from experience in such matters, he judges that considerable of the area directly to the northwest of the point marked 27.5 would have peat or soft material extending at least 48 feet in depth and with the chance that somewhat greater depths might be reached; that in making these punchings or soundings the rods previously described were put down by one man simply by the strength of the hands placed on the top of the rod, and punched down; that hard bottom or so-called hard bottom was noted when considerable resistance to the end of the rod was felt, (1824-1825) in other words, when but very slight movement in advance was made by pressure on top of the rod; that as to the type of soil at the bottom of the soundings in this area, about 27.5, no samples were obtained of the material, but as the rod penetrated the lower limits of the soft material in his opinion there was either sand or gravel; that possibly clay may have been encountered; that there was no way of knowing what the material was except it was not bed rock, because it was somewhat resilient to the rods; that (1828) the soundings similiar to those made in Wenham Swamp were made in the low lands about 600 feet down stream from the southwesterly corner of Martin's Pond; (Exhibit C-33) that the depth of soft material varies from 4 feet near the shore of the upland of the swamp to a maximum of 28 feet in the vicinity of the brook; that (1829) in the particular sounding of 28 feet, the rod being open-ended, a very fine material which had the appearance of blue clay was brought up on the end of the rod; that however the material encountered as resistance was more or less resilient and was

not bedrock, nor apparently in the vicinity of bedrock; (1829) that the material in the hill directly northwest of the word "Salem" in the word "Salem and Lowell Railroad," was apparently a coarse gravel and sand—(1830) very porous, open material; that his personal opinion is that peat is objectionable because it contains a large quantity of organic material; that with a comparatively shallow storage of water on top of the peat, there must be more or less organic material mixed in with the water, which organic material would form food for microscopic organisms creating an objectionable water supply; that these growths would make the water more difficult to treat by filtration; (1831) that he would hardly know what growths might appear after the area was inundated, because of the change in character of the entire swamp; that there were no growths when he examined the swamp on March 15, 1930; that it is quite customary to treat reservoirs with copper sulphate to remove certain micro-organisms.

KARL R. KENNISON, witness for Massachusetts, (1834) designing engineer of the Metropolitan District Water Supply Commission since 1926, testified that he had read or heard, or both, Mr. Jacobs testimony about the Merrimac River plan; that (1835) he had made a study of different water supplies in eastern Massachusetts; that he believed that the diversion of 200 million gallons a day from the Merrimac River at or near Tyng's Island is impracticable if not impossible of operation because it takes such a large percentage of the low flow of the river, the entire low flow being (1836) needed for the industrial life of the Merrimac Valley and for navigation below Haverhill; that the cities of Lawrence and Lowell are two of the largest cities in the state and were built up around the water power of the Merrimac River; that their entire life depends upon the water; that to take away practically one-third of the low water flow would mean a practical confiscation of the pondage rights in Lowell and would surely bring about the intervention of the War Department as far

as navigation is concerned below Haverhill; that the modification of the plan as subsequently testified to by Mr. Jacobs would make the scheme physically possible of performance, but that the damage would be the same; that he understood the modifications as proposed by Mr. Jacobs in his subsequent testimony, proposed to count on all the storage in the Foster-Martin Reservoir to tide over a low water condition in the river; that (1838) it was not brought out in the record to what extent Mr. Jacobs planned to count on the storage; that Mr. Jacobs suggested that the 18 billion gallons storage might be drawn down to 10 billion; that that would mean 8 billion gallons drawn down, or 40 days supply at 200 million gallons a day; that the witness does not think that the modification makes any material difference in his conclusion that the Jacobs scheme is impracticable because it takes too much water out of the Merrimac River; that (1839) *the witness has made a study of what might be done with the Merrimac River provided that the Metropolitan District was forced to go to it for additional water;* that in his opinion a more practicable scheme would be what might be called flood water only from the Merrimac River; that there are several considerations entering into the determination of such a flood limit; first, that the War Department would undoubtedly require such a limit so far as navigation interests below Haverhill are concerned; that if a minimum flow below which no water could be diverted is taken in the vicinity of 0.6 cubic feet per second per square mile, it would correspond to a flow in the Merrimac River above Lowell of 2400 cubic feet per second; (1840) that if the action of the War Department on the Ware River is taken as a criterion, no diversion could be made whatever between June 15th and October 15th; that it is not known what the War Department might do on the Merrimac River but that it is clear that some limit would be set; that the sanitary conditions are more important; that the Merrimac River below Lowell, and as it passes thru Lawrence, is at times of low flow, a very highly polluted stream; that if any substantial quantity or even part of the low flow, were taken away, remedial

measures of a very drastic sort would be necessary; that therefore, again a flood flow proposition is indicated as the most feasible; that the principal criterion, though, that determined the amount which I have stated here, is specifically computed by taking the minimum requirements of the Proprietors of the Locks and Canals at Lowell, who are obligated to deliver to their various mills 3,600 cubic feet per second for 15 hours a day. That is the exact equivalent of 2,250 cubic feet per second for 24 hours a day. So that, just for the purpose of developing a diversion from the Merrimac to see what could be done, I have taken 2,250 cubic feet per second as a limit below which no flow could be taken from the Merrimac, and then have attempted to see what could be done in the way of getting a supply from the Metropolitan District that would be comparable in quantity with the Ware-Swift supply, although it seems to be impossible to make it comparable or anywhere near comparable in quality.

Q. You took that, as I understand, because that is the limit below which they could not go without interfering with the power requirements? A. Without interfering with the prime power requirements.

Q. That is what we call permanent power? A. Pardon me, it is not exactly the prime requirements. It is the contractual obligations of the Proprietors of the Locks and Canals.

Q. It is the permanent power that the power company is liable to supply its customer with? A. The permanent power is determined by the actual amount of water in the river, regardless of any legal documents bearing on the subject.

Q. It is the amount that is called for by the contracts? A. Yes.

Q. What did you say would be the limit if the War Department applied the Swift River diversion decision? A. Approximately 2400 cubic feet per second.

Q. On either basis you would arrive at pretty nearly the same figure? A. Yes, and I find when I compute the yields that I have to pull that limit down a little below 2400 in order to get this quantity out of it that is comparable with the Ware-Swift.

Q. You mean from the flood waters? A. It is necessary, I find, to set a limit as low as 2,250 in order to obtain a supply comparable in volume with the Ware and the Swift.

Q. By that you mean how much? A. 191,000,000 gallons per day in 1970.

Q. How much did you say? A. 191,000,000 gallons per day for the district.

Q. So that you had three reasons, practically, for taking that figure. A. Yes.

(1841) that he believes that this basis explained above would be as good a development, assuming that the district was obliged to go to the Merrimac River, whether it wanted to or not, neglecting that fact that it is really impossible to get as good a supply from the standpoint of quality; (1843) that he agrees with Mr. Jacobs that Merrimac River water ought to be treated by storing, filtering, aerating and chlorinating; that he was unable to find as much storage as he would like—not as much as Mr. Jacobs' scheme provided in proportion to the rate of flow through the filter plant; that the only place where this water that is to be pumped from the Merrimac River can be stored is in the Ipswich River Valley, combining the water of both streams, which necessitates taking the communities of Essex County into the District, and supplying their needs also, because they are already supplied from the Ipswich River sources; (1844) that the 191 million gallons per day is net increase in safe yield to the District supply; that the proposed system would have to be operated to a considerable extent in coordination with present sources by shutting off the flow from Wachusett Reservoir every wet period at the beginning of the spring and pumping that much more from the Ipswich and Merrimac Rivers; that the additional yield obtained from the Merrimac-Ipswich combination alone falls about 40 or 50 million gallons per day shy of the necessary quantity above this flood limit of 2250 cubic feet per second, but that if the two system (Wachusett and the Merrimac-Ipswich) are operated in coordination, more water can be obtained, as it obviates the possibility (1845) of water wasting from the

Ipswich storage reservoir because it is impossible to make that reservoir large enough; (1846) that to obtain 242 million gallons per day an available storage of 36 billion gallons is required, and allowing 10 billion gallons to remain in the reservoirs, a total capacity of 46 billion gallons is required; that this storage is required to obtain 191 million gallons per day net for the District—242 million gallons per day gross—the difference being made up of 42 million gallons per day to satisfy the Essex County communities' requirements in 1970, and 10 million gallons per day which must be let down the Ipswich River past the dam; that the only way to get 46 billion gallon storage is to raise the level of the upper basin by about 15 feet over that which Mr. Jacobs provided in his plan; that both Mr. Hazen and Mr. Jacobs planned an Ipswich Reservoir divided into two basins; (1847) that the *Jacobs' plan* of the Merrimac-Ipswich development as modified by witness Kennison, is shown on Exhibit D-25; that the storage in the Foster-Martin Reservoir is entirely inadequate to obtain the yield required to compare with the Ware-Swift supply; that he concluded that no enlargement of the Foster-Martin Reservoir is possible; (1848) that the 46 billion gallon reservoir is many times smaller than would be required for the economical development of the proposed supply, although this size will barely suffice; (1849) that the 46 billion gallon reservoir is formed by two basins; that it is impossible to get that storage in one basin because of the topography at the extreme right-hand corner of the watershed shown on Exhibit D-25, so that the limit in capacity is about 20 billion gallons, but that there is some physical possibility, however (however uneconomical) to obtain greater storage in the upper basin by raising the flow line from elevation 55 to 75; that Mr. Hazen used a flow line at elevation 55 and Mr. Jacobs one at 60; that this increase in flowage runs back into expensive real estate in the towns of Topsfield, North Reading and Middleton; (1852) that this so-called Kennison plan involves incorporating into the Merrimac River project the Ipswich River portion of what has been sometimes called the Fifteen-

Watershed Scheme; that when the Ipswich River is used as a storage basin in conjunction with the Merrimac River supply the possibility of getting 17 million gallons per day from the Ipswich River alone is sacrificed, and in the critically dry period all the water obtained is what the watershed itself will yield; (1855) that this scheme required works at the Merrimac River intakes having a capacity of 420 million gallons per day; that this is the rate at which the water would have to be pumped during those months of so-called flood flows (in excess of 2250 cubic feet per second); that the intake proposed by Mr. Kennison is at substantially the same point as that proposed by Mr. Jacobs; that instead of pumping through two pipe lines for the entire distance he has provided for pipe lines only about 2½ miles in length, to the head of a grade conduit, and taking advantage of the old Middlesex Canal to take the water by gravity into an open channel running into the upper end of the Ipswich Reservoir; that this channel would have to be prepared to take the water pumped for a distance of about three miles; that his scheme provides for filter beds located at the south end of the reservoir instead of at the north end as proposed by Mr. Jacobs, in order to save money; (1857) that his scheme is one which would yield a supply of 191 million gallons per day in 1970; that he believes that the depreciation, as a whole, of this proposed supply would be high, as compared to the Ware-Swift; that in discussing depreciation as a whole he has in mind that different supplies of the Metropolitan District have had to be abandoned because they were close to the Metropolitan center; that in his opinion this plan will ultimately have to be abandoned because it is putting the water supply into an area in which the population is rapidly increasing instead of one in which the population is decreasing, as in the case of the Swift; (1859) that while the major jart of this supply comes from the Merrimac River, the reservoir is in the rapidly growing suburban district in Essex County; that this fact would indicate that the supply would have high depreciation value; that when he said population as an index, he had in mind population as a cri-

terion of industrial development also; that what might happen to the Merrimac River in New Hampshire has been omitted entirely in consideration of quality, except that he has allowed 10 billion gallons to be left in the reservoir as a minimum; that this is the only consideration of quality which he has allowed to enter into this comparison; that the Foster-Martin Reservoir has been discarded because if 10 billion gallons is left in the reservoir, it would net only eight billion gallons; that the cost of this is so much that the storage can be obtained more economically (1860) in the Ipswich basin itself; that the Foster-Martin Reservoir storage could be added by providing additional pipe lines to it from the pumps; that in discussing leaving 22% of the capacity of the Ipswich Reservoir as a minimum, it would be necessary to leave a much smaller proportion of that in the upper basin, and a larger proportion in the lower, because the lower basin is the one from which the filter plant directly takes its water, so that this plan necessitates (1861) drawing almost to the very dregs, regardless of the fact that that is not desirable from the standpoint of quality; that Wachusett Reservoir, with a total capacity of 65 billion gallons, has never been drawn lower than 30 billion gallons; that this is a larger percent of minimum water kept in the reservoir than he has been discussing for the Ipswich River Reservoir; that the filter plant must have a total capacity of 342 million gallons per day made up of 191 million gallons per day for the District, 41 million gallons per day for the communities in Essex County, an additional 100 million gallons per day to take care of the necessary coordinate operation with the present sources and approximately 10 million gallons per day extra of wash water and aeration losses in the process of filtration, but that in the estimates of cost he has included only about 320 million gallons per day because (1862) the excess filter capacity to provide for Essex County Community would not be chargeable to the District; (1863) that the filters would have had to have an overload capacity to take care of such conditions as occurred in the District's demand in 1918; that this excess demand is

sometimes caused by a cold winter when people leave their faucets running to keep from freezing, other times by dry periods when an excessive amount of water is used for watering lawns and gardens; that, as a matter of fact, the maximum week in 1918 of consumption was 40% more than the ordinary expected capacity during those years; that he has allowed only 25% excess capacity in the pipe lines; (1865) that the Ware-Swift supply has that same sort of excess capacity in the aqueducts; that in 1918 the excess capacity (1866) was taken care of by the aqueducts without even approaching their capacity; that he has chosen as the dam site for the lower reservoir the site used by Mr. Hazen, who made a very exhaustive study of that lower basin for the water supply of the cities of Salem and Beverly, rather than the site a little farther down the stream which Mr. Jacobs used, the principal reason being that it is very difficult to take care of diverting the sewage and drainage of Topsfield if the lower site is chosen; that his plan, with the shorter pipe line and grade conduit involves pumping against a lower head than Mr. Jacob's plan; (1874) that from his experience in water supply engineering he would say that a source of supply, polluted, was entirely unacceptable to the people who elect representatives to the Massachusetts Legislature; that from listening to hearings before various legislative committees in which the views are expressed, he would judge that public opinion was very much against polluted sources of water supply; that from those hearings he learned that the communities and industries on the Assabet River considered that any such development as Mr. Hazen proposed, and such as Mr. Jacobs now proposes, to cut off the entire upper flowage of the Assabet, would be regarded (1874) by them as entirely unwarranted, and such a project would be fought by them in the legislature; that the most outstanding fact about those legislative hearings on the Gow plan, so-called (Ex. C-2) was the fact that the Essex County communities, as a whole, considered that the Ipswich River belonged to them for their water supply, and that they would fight any such project in the legislature to the best of their ability; that any such project as the Metropolitan

District going up to Essex County and taking that supply (which, it was even admitted by Mr. Hazen and Mr. Gow, and others, would ultimately be used entirely for the Essex County communities) would simply be a makeshift for the District; that he thinks the principal reason why they were opposed to it was not necessarily the actual taking of the water, but the development in their growing community of a large reservoir that would prohibit their natural growth, and also that by necessity, its operation, an account of its being such a shallow reservoir, it would make an unsightly and probably a foul smeelling mess in that general locality of high real estate values; (1876) that he does not consider that this would be at all an ideal reservoir site, and in order to make it acceptable at all considerable treatment of the bottom would have to be made; that he has included in his estimate figures similar to what Mr. Hazen included for putting in a dredge and working continuously to improve the shallow flowage areas; that, even so, he is not sure from any personal knowledge that it could be made acceptable, because he knows that the basin is filled with a deep amount of peat deposits; that by spending an excessive amount of money the peat deposits can be covered up with clean gravel; that a peat bottom is objectionable because it tends to create an excessively high color, and would also create growths of weeds when the water is shallow; (1877) that the communities in the Ipswich valley appear to be growing at a more rapid rate than any other suburban area and that it is a fairly well settled section anyway; (1941) that the nine little watersheds on the Assabet River suggested by Mr. Jacobs in what is called the Fifteen-Watershed Plan, constitute the only drainage to the north of this entire section 20 miles west of Boston; that, in his opinion, as a practical matter, the water of a number of small systems with one main system of better quality is bound to result in a loss of capacity in those smaller systems, because it is contrary to human nature to start to use those smaller scattered, more expensive and inferior sources as soon as they ought to be used in the spring in order to obtain the safe yield, which is theoretically computed as available from such sources;

that he does not consider that the Shawsheen and Lower Sudbury should be considered in any sort of comparison; that it is possible to take some of the head waters of the Assabet and obtain, simply as an emergency source for the Metropolitan District, somewhere between 11 and 15 million gallons per day, as has been suggested in (Exhibit C-1); that in an emergency developed by some earthquake, for instance, the District might be forced to develop an emergency supply there, but that it would not be looked to for a regular supply certainly (1943) not in 1970; that the population of the entire Assabet watershed is approximately 172 persons per sq. mile, and that there are approximately 50,000 people already taking their water supply from that area outside of the District.

Q. (Mr. Averill) Mr. Kennison, if by any chance you couldn't get the Ware and Swift Rivers, couldn't you develop the water supply which you have testified today? By seriously impairing the industrial and other growths of this eastern part of Massachusetts, it is physically possible to obtain the water.

Q. It can be developed? A. It certainly can be dammed. It is physically possible.

Q. How long have you been working on this plan, this combination Merrimac-Ipswich plan? A. Since the testimony in this case has led our attorney to suggest that we see if we cannot make the best possible scheme out of the Merrimac and see really what could be done.

Q. (By Mr. Warren) Just one moment. You spoke about the impairment of the industrial prosperity of the eastern Massachusetts District. What do you mean by that? A. I believe there is an exhibit showing the relative growth of the (1945) eastern part of Massachusetts compared with the western part, which indicated that this is a rapidly growing section of the State, and we cannot devote large areas such as a big storage basin in the Ipswich Valley for water supply purposes without retarding the growth.

Q. And do you think it is a legitimate consideration to which hydraulic or water supply engineers should give attention, the industrial need of water for process and other purposes in industry? A. I think it is very important, yes.

MR. WARREN. That is all.

MR. AVERILL. You don't believe that water supply for domestic purposes comes first, before everything?

THE WITNESS. Yes.

MR. AVERILL. All right, that is all.

Q. But you believe with this fine supply from the Ware and Swift Rivers, with only 30 or 40 people per square mile, that that ought to be available water, don't you? A. Yes.

Q. And by using that you haven't got to ruin the industries in the eastern part of the State and leave that water going to waste up there? A. No.

(2116) that Exhibit D-29 is a tabulation of expenditures for the Ware-Swift project to March, 1930; (2117) that Exhibit D-30 is a table showing the comparison of the Connecticut and the Merrimac rivers with respect to navigation and diversion; that Exhibit D-31 is a tabulation consisting of comparisons of growth of population on the Ware, Swift and Merrimac watersheds; that an estimate of water supply requirements in Northeastern Massachusetts, including Worcester and other westerly communities depending on the Metropolitan District is Exhibit D-32.

Q. (By MR. AVERILL) If by any chance you cannot get the Ware and Swift, it is going to be necessary for you to go to the Merrimac, isn't it? A. It appears it would be necessary to gradually curtail the growth of the district to that extent.

Q. Do you mean to say as an engineer that if you had to you could not furnish a water supply sufficient for Boston by 1970, from the Merrimac and other sources in eastern Massachusetts? A. I think it is entirely probable that industries contemplating establishment in Boston might move somewhere else if they could not get a proper water supply.

Q. As an engineer, you do not want to go on record as saying that you could not furnish Boston with a supply for 1970, if you had to, from the Merrimac and other eastern supplies? A. It is physically possible to do so.

Q. (By Mr. Warren) But, taking into consideration all the elements that govern the selection of a source of water supply, (2130) you think, as an engineer, that it is necessary to go to the Ware and Swift Rivers? A. I do.

WILLIAM F. UHL, consulting engineer, called by Massachusetts, testified (1781) that he has been consulting engineer for some of the lessees of the water power companies on the Merrimac river; (1782) that he is familiar with the water power of the Proprietors of the Locks and Canals, which is the power company at Lowell, as well as with the Essex Company at Lawrence; that these companies are water companies and sell mill power under perpetual leases; that the Essex company was organized about 1845 and the company at Lowell about 1830; (1784) that the water power development at Lowell consists of a dam constructed across the river, which diverts water into two principal canals, which in turn conduct the water to where the water power wheels are situated; (1785) that the total horsepower developed at Lowell is thirty thousand horsepower; of which eleven thousand is permanent power and the balance surplus power; that the eleven thousand horsepower is available at least fifty-four hours a week, the rest being available at times more or less depending upon the flow of the stream; that the balance of nineteen thousand horsepower is more or less uncertain depending upon the flow; (1787) that he is familiar with Mr. Jacobs' project to the extent of having studied Mr. Jacobs testimony for taking water from the Merrimac river only to the extent that it involves the taking of two hundred million gallons per day out of the Lowell pond, which is the pond extending about nineteen miles upstream above the dam; that he figured on Mr. Jacobs' project taking two hundred million gallons per day; (1789) that the Lawrence layout consists of a dam and two canals, one on each side of the river, each running practically parallel with the river; that the mills are between the canals and the river and draw their water from the canal and

spill it into the river without any intervening pond; that the dam at Lawrence backs water up practically a distance of nine miles; (1790) that assuming that the diversion is simply a diversion out of this pond without any interference in the pondage control, it is purely a power loss represented by the quantity of water; that two hundred million gallons a day is the equivalent of three hundred and ten cubic feet per second which would come directly out of the permanent mill powers, permanent leases; that the low flow of the Merrimac river is just about sufficient to produce the water for the permanent mill powers; so that, if the three hundred ten cubic feet per second is diverted, about twenty-five per cent of the permanent mill power will be destroyed; that, in addition to that a loss of power, from thirty to forty per cent of the time during the low flow periods in permanent and surplus horsepower hours, as well as the capacity loss, would result; that, if the diversion is made, the mills will have to provide for approximately 2130 kilowatts more standby power, either in the way of steam capacity or purchased electric current, and will in addition have to supply something over six million kilowatt hours of power; that, if the diversion interferes with the pondage control by the Proprietors of the Locks and Canals, they will, in addition to this twenty-one hundred and thirty kilowatts of capacity which will be lost, have an additional loss of capacity depending upon the interference with pondage control; and insofar as the pondage of water over week ends and overnight is concerned, (the mills operate only about fifty-four hours a week out of a total of (1791) 168 hours in a week), water will have to be stored and it will be necessary to draw from or pull this pond as much as six to seven feet by Saturday noon in order to be able to pond the week end flows, and smaller amounts overnight; that, since this pond is only about fifteen feet deep, it is probable that the Water Supply Commission will have to make an agreement with this power company to maintain its pond at an elevation perhaps not more and not less than two or three feet below this dam or it would be necessary to build an additional dam some place in the Lowell ponds in order to assure themselves of always

having sufficient depth of water at their intake; that, therefore, if this interference with the mill pond should be brought about by taking the water from the mill pond continuously, all or practically all of the permanent power would be destroyed at those places; that the reason why the interference with the control of the pond makes so much difference is because it would make it impossible to pond the water over the week ends and overnight at will as is now being done, and the assurance of always having 1200 cubic feet per second for short periods would be destroyed; (1792) that, if the two hundred million gallons of water were taken out during the ten per cent of the time when the flow is the greatest, it would probably have no effect whatever; (1793) that where there is surplus water in the river, that water is used to increase the water power in the mills; and when the surplus water is not there the mills have to get that power either by steam or by electric current; (1794) that there is a possibility of redevelopment at Lowell and Lawrence, and tentative plans to that extent have been made as far as ten years ago; that this, if carried out, would mean a much more complete utilization of this power; that, in his opinion, both of these power companies may abandon their present use of the property and develop instead single hydro-electric plants; that in his opinion that will be done within a very short period of time and (1795) will very largely increase the utilization of these water powers; (1795) that the estimate of damages, assuming no interference with pondage control, for both Lowell and Lawrence, under this plan would be $2,851,000, which would not take into consideration any community damage due to the reduction of this important local natural resource; (1796) that by this he means that every home owner and every merchant would be affected by a reduction of this water power in Lowell and Lawrence; that he would not attempt to compute this damage, which is an indirect damage; that it would be a very real damage to both Lowell and Lawrence; that if the pondage control was interfered with the damage for both Lowell and Lawrence would be about $5,410,000, without including anything for the community

damage; (1798) assuming that the redevelopment of which he spoke was engaged in, and that there was interference with the pondage control, the damage might run at least as high as eleven million dollars, and if assuming no interference with pondage control, the damage would be about $5,466,000.

JAMES F. SANBORN, of New York City, testified (1878) that he is a consulting engineer; (1879) that he was employed by the Metropolitan Water and Sewerage Board on the development at the Wachusett reservoir; that he has heard Mr. Kennison testify as to the plan which he described; that he has heard the plan outlined by Mr. Jacobs and confirmed by Mr. Gregory; that the plan outlined by Mr. Jacobs would interfere with the water in the Merrimac river; that there would not be sufficient water to permit a daily draft of the amount required by Mr. Jacobs' plan; (1880) that he does not believe that the amount of storage in the Foster-Martin reservoir, proposed by other witnesses, could be maintained; (1882) that he believes that the water from the Merrimac river would be difficult to treat, but that he is not an expert on water treatment; that the water of the Merrimac river (1883) would not start with as good quality as if it came from the Ware and the Swift; (1884) that the plan would not work out well; that you would have to contend with bad water at times of low flow in the river and when you had to stop pumping for several days at a time due to interference with the flow, you would have bad operating conditions in the reservoir due to drawing it down; that even if you could buy the right to draw at any time, there would still be poor water at times of low flow; that there would be perhaps also difficulty with the War Department requirements, which would limit the opportunity for draft there at periods of low flow; that they have discussed the probable demand of the War Department, based on the demands in the Ware and Swift case; (1886) that he is familiar with the plan which Mr. Kennison

outlined; (1888) that, considering the limitations assumed by him, the plan outlined by Mr. Kennison is better than Mr. Jacobs' plan, either with or without the modifications which he later suggested to it; that it is the best plan that can be devised for this project of taking water from the Merrimac river for use of the Metropolitan Water District; that the limitations which he assumed are those stated by Mr. Kennison; (1889) that the reservoir provided in the Kennison plan is not big enough for the best results in taking water from the Merrimac river; (1890) that Mr. Kennison's plan is the best plan that has occurred to him or to his associates; that it is a very poor plan and not to be considered if you could go to the Ware-Swift; that if you could go to the Ware-Swift, they would not think of adopting it; (1891) that, if the Kennison plan were put up to him as a plan for supplying the Metropolitan District with water, he would want to examine the situation very thoroughly to see if any other supplies were available; that the raw water from the Merrimac river is very inferior water compared with the Ware-Swift supply; (1892) that the quality of the water is affected very much by the depth of the reservoir; that with a full reservoir you get a fairly good water, but if you draw the reservoir down so that you expose the shallow areas you would get a very poor water; that if the reservoir at the Foster-Martin pond were drawn down (1893) to ten billion gallons, or ten feet instead of eighteen feet deep, and no pumping was done from the river during the lower stages, you are liable to get some very bad water; that an 18 billion gallon reservoir would not be sufficient to take care of the flood river flows of the Merrimac river, and would not take care of whatever larger amounts it would be necessary to divert in order to make up for the days when no diversion could take place; that the reservoir would be large enough if you could count on diverting two hundred million gallons every day in the year; (1894) that this assumes that there is perfect storage in the reservoir and that there was not rapid travel of the water through the reservoir; (1895) that if no water could be diverted from the river for a period of thirty

days, and water was drawn from this reservoir during this period, that would take six billion gallons out of storage in the reservoir and a condition would result when they feel very strongly that it would be a serious operating condition; (1896) that at the end of sixty days, if no water could be diverted, there would be about six billion gallons left in the reservoir, and that situation would be still worse; that the scheme would not be a good scheme, and would break down somewhere in between the thirty day and the sixty day period; (1897) that storage alone in the Foster-Martin reservoir would not bring the water up to the standard of the Ware-Swift water; that, if the Merrimac river water was treated as Mr. Jacobs planned to have it treated, stored in the Foster-Martin reservoir for ninety days, filtered, chlorinated, aerated and coagulated, it is (1898) his opinion that the water would not be as good as from the stored Wachusett reservoir; that his judgment is based partly on the difficulty of conducting a perfect process; that, if the Ware-Swift water which was brought into the Wachusett reservoir is chlorinated, he feels pretty sure that that water would be better than Merrimac river water treated as proposed by Mr. Jacobs; that if the Ware-Swift water were filtered as well as chlorinated, the Ware-Swift water would be better than the Merrimac river water; (1899) that referring to the future of the supply from the Merrimac river, studies have been made of the population increase in the area of the Merrimac river and in New Hampshire, and the indication is strongly that in forty or fifty years there will be a strong inclination to abandon such a supply; that the growth of the population from the Boston district is going up into that watershed on account of the rapid increase and use of automobiles; that those studies indicate that in about forty or fifty years there will be a density of population there such as to warrant the assertion that the reservoir would be (1900) badly polluted; that if that happens it would be necessary to look elsewhere for a supply; (1901) that the Ware-Swift watershed is an area of decreasing population and of decreasing industry; that a great many small industries are being abandoned in

the upper part of the watershed; that it is an elevated area of hard rock and sandy soil, admirably adapted to an upland supply; that pure soft water can be obtained from such an area and that it is a more desirable watershed from which to draw; that, eliminating the question of cost, the Ware-Swift scheme is better than the Jacobs scheme, either in its original form or as modified, or in the form as dressed up by Mr. Kennison; that the quality of the water is better in the Ware-Swift watershed; (1902) that for a big water supply it is considered better to go to the pure source and that that is done very generally in the eastern country; that that is done wherever there is a pure source available; that public opinion with respect to a source for a water supply is always considered; that he agrees with Mr. Jacobs that public opinion is sometimes the controlling consideration; that he has studied the suggestion of Mr. Jacobs which was Mr. Hazen's suggestion with some alterations and which has frequently been referred to as the Fifteen Watershed project; (1903) that it is open to the general objection made to the Merrimac supply, that those areas are already well polluted and have an increasing population, so that there would be a constant tendency to increase pollution and be faced with the expectation of abandoning some of the area after a few years; that it is too near the center of population and industry; that as to that portion of this plan which would obtain seventy millions gallons per day from the Ipswich river it is his opinion that there would be a tendency to curtail it as time went on and ultimately to abandon it; that the Assabet portion of this plan provided for about twenty-seven million gallons a day from nine different watersheds, with pumping in some instances, and filtration of the whole supply; that the lower Sudbury portion of this plan involved pumping and furnishing filters to supply seventeen more million gallons; (1904) that the Shawsheen portion of the Fifteen Watershed plan involved pumping also; that he does not like the Fifteen Watershed plan at all; that there is the objection of providing four filter plans and that there is objection of the difficulty in controlling the pollution; that in

his opinion it would not be a permanent source for additional water supply for the Metropolitan District; that it is his opinion that popular opinion would force the abandonment of the Merrimac river supply if it should be adopted at the present time; (1909) that he is not an expert in water treatment; (1910) that his opinions previously given are his opinions as a water supply man and not as a result of study of any analyses and that he has had no details; (1911) that he understands that the plan developed by Mr. Kennison was developed since the Jacobs' plan, so-called, was submitted to the court in this case; that the Kennison plan is a combined plan for the utilization of the waters in the Ipswich valley (1912) and that when necessary that supply is augmented by a draft from the Merrimac river; that the first stage in the Kennison plan is to take fifty million gallons a day from the Ipswich river for the Metropolitan District; that this allows thirty million gallons net for the population now getting water from that source; (1913) that these communities are using at the present time about eight million gallons a day; that he means the people in Essex County are drawing that amount from the Ipswich river, supplementing their other supply, and this thereby avoids adding any considerable body of consumers to be supplied from the Metropolitan District; (1914) that he estimates the available water in the Ipswich river at eighty million gallons a day as developed by this storage; (1915) that if six billion gallons are drawn out of the Foster-Martin reservoir it would lower the reservoir about five feet; (1916) that when the Foster-Martin reservoir was drawn down from eighteen billion gallons to twelve billion gallons, the area that would be exposed would be all sand, rock, pavement and loam; that the witnesses's objection is not so much to the part of the reservoir that is above water but rather to the decrease which would result over the remainder, and the probability of algæ hatching, and also the fact that you have only sixty days of storage, and the further difficulty of the entering water forming a continuous flow and getting to the outlet in less than sixty days; that the smaller the reservoir the greater the liability of that

happening is; (1926) that the treatment of water by filtration and other devices for the removal of bacteria and organisms is a specialty; that bacteriologists and filter plant operators are particularly experienced in that line and he is not that kind of an expert.

MR. FRANK A. BARBOUR, an expert witness for Massachusetts, testified (1945) that he is a consulting engineer specializing in water supply and sewage disposal; (1951) that he is familiar with the water supplies and water consumption in Eastern Massachusetts; that during the hearings on the relative merits of the Ware-Swift and the so-called Hazen project, he represented the town of Peabody and attended the majority of the hearings before the legislature; that he has studied the Merrimac project as submitted by Connecticut; that with reference to the Merrimac as a water supply, as suggested by Mr. Jacobs in his testimony, (1952) he thinks the first thing to be considered is the necessity of taking the water immediately below the New Hampshire line, which at once emphasizes the fact that it is taken at a point where Massachusetts has no control over the amount of sewage or industrial waste which may be admitted to the stream; that in 1920 there were three hundred and fifty thousand people in the Merrimac valley watershed above the proposed intake at Tyngs Island, one hundred and thirty thousand of which were in the three cities of Nashua, Manchester and Concord, located on the main stream at distances respectively of twenty, twenty-five and forty-five miles above the proposed intake; that the discharge of these cities enters the Merrimac River without treatment; that he thinks a half a million people would probably be the population within a period which might be well taken into account in the present case; that he knows of some seventy-five plants on the river, including twenty-five paper mills, three tanneries, one rendering works, two cellulose product works, eleven cotton mills, twenty-five woolen mills and eight gas works; that this

does not include all of the plants as he has not had an opportunity to check up on all of them; (1953) that the majority of these plants are in New Hampshire; that you therefore start with the Merrimac as a stream highly polluted by sewage and industrial wastes, the control of which lies in another state, and the intake as proposed is immediately below the state line; that in the next forty years he cannot see it in any other way than that there will be a normal increase in pollution; that he thinks the Merrimac must always be a drainage artery and that it has always been so recognized; that such recognition has been registered by the Massachusetts Legislature in taking this stream out of the control of the State Department of Health within the limits of Lowell; that he believes that economic necessity requires that rivers shall be recognized as carriers of waste within certain limits; (1954) that it is his opinion that the present tendency in water supply is to go to the head waters of the stream because of the inevitable pollution in large rivers in their lower reaches; that this is indicated in numerous places by recent water supply developments; that he refers to the abandonment of the Passaic river by Jersey City, and the abandonment of that river by Newark; that Paterson, Passaic, Clifton and other towns in New Jersey are participants in the so-called Wanaque scheme in which they undertook major expenditures in order to enable them to get away from the Passaic river; that Albany has gone into an upland supply and abandoned the Hudson; that Hartford did not use the Connecticut river; that Lawrence has been trying for years to get rid of (1955) the Merrimac; that he thinks a large number of other cases could be cited, indicating the tendency toward the abandonment of polluted rivers in favor of upland supplies; that a responsible engineer would have to take into consideration the possible future development along a river such as those he has mentioned, in using them for a water supply; that he has to anticipate that industrial development will increase and recognize that at any time works may be located on the river which would result in phenol or other wastes in solution which would be difficult to remove; that within a month Philadelphia had

a terrible case of gas works waste in the Schuylkill river, which is one of the sources of Philadelphia's water supply; that the Merrimac projects stated by the Connecticut witnesses involve continuous diversion, storage, aeration, coagulation, filtration and chlorination; (1956) that his first criticism of the scheme would be that the storage in the Foster-Martin reservoir would not be more than fifty per cent effective under normal conditions; that due to its shape and the various bays and coves, the water would run through the reservoir without the volume becoming more than fifty per cent effective; that under certain wind conditions the water would pass from the inlet to the outlet in less than twenty days, and possibly in half that time; that the reservoir has an area of four and a quarter square miles; that, of the total area flooded, twenty-four per cent has an average depth of five feet; that of the total area flooded twenty per cent is swamp with a muck bottom, peat; that within a few days soundings have been made up there and without any effort gas pipes have been sunk to depths of twenty-eight to thirty feet, which shows the soft nature of the soil; that in the Foster-Martin reservoir it is proposed to store water forty feet or more above the normal ground water level of the Ipswich valley; (1957) that in his opinion a very substantial percentage of the water that is pumped to that reservoir will leak out through the ground by seepage into the Ipswich valley; that the effect of muck on the bottom of the reservoir will result in the development of micro-organisms which will give rise to tastes and odors very difficult to remove, and also probably to micro-organisms that will interfere at times with the filtering processes; that there has been a classic example of this in the Ludlow reservoir at Springfield, where the reservoir is not so deep as this but where the outstanding condition was the muck bottom; that this Ludlow reservoir, which was the water supply for Springfield, has been abandoned; (1959) that there will be a deposit of sludge from the Merrimac river which may further emphasize by decomposition this growth of micro-organisms and the development of tastes and odors; that under certain conditions water may get through

the reservoir from the inlet to the outlet in less than twenty days and possibly as low as ten days; that with one hundred per cent success in operation the plan will give an entirely safe water, outside of the danger of these organic tastes and odors which periodically will make the water unacceptable to the consumer; that a safe supply and an acceptable supply outside of those periods can be furnished; that, because of the particularly polluted character of the water, the project is open to the always existing objection of danger of breakdown in the filter plant, that such things do occur in the operation of filter plants and in the chlorination process; that within a month there was a shut down of ten days in Cambridge due to the breaking of a force main at the plant, entirely out of the control of the operator of the plant; (1960) that it is not possible to have one hundred per cent operation efficiency; (1967) that the continuous diversion of two hundred million gallons per day from the Merrimac is unthinkable, not only because of the industrial development below, but because of the stipulations which the War Department will set up; that with reference to the War Department action he has tried to test the Merrimac scheme on two bases: first, that the War Department would set up the same stipulation as they have on the Swift river, namely, that the diversion would be limited to flows in excess of approximately six tenths of a cubic foot per second per square mile of drainage area or in excess of a total flow to be limited to twenty three hundred cubic feet per second; that he has also tested the scheme on the assumption that a part of the War Department stipulation used on the Ware River project would apply, namely, that no diversion between June 15 and October 15 would be permitted, and only a diversion in excess of twelve hundred cubic feet per second during the remainder of the year; that twelve hundred cubic feet per second is used because of the fact that that (1968) is the amount of the continuous twenty-four hour flow necessary for firm power at Lowell; that it is the minimum flow of the river practically which, by utilization of the pondage above the Pawtucket dam at Lowell, will enable the mills to operate fifty-four hours a

week; (1970) that he does not believe that one can get the storage that is necessary in the Ipswich valley to develop the same yield from the Merrimac as can be obtained from the Swift, assuming that water is taken from the Merrimac only in excess of twenty-three hundred cubic feet per second; that, if water from the Ipswich valley is considered, another element is brought into the case over and above what enters into the Ware-Swift project, because in that case rights now allocated to cities in the Ipswich valley are being invaded, so that to obtain the gross yield from the Merrimac and Ipswich combined, the requirements of the Ipswich cities in 1970 would have to be subtracted, as well as a reasonable allowance for release down the stream; that the requirements of the Ipswich cities in 1970 is estimated (1971) at forty-one million gallons a day, and the release down stream at ten million gallons a day, a total of fifty-one million which should be subtracted from the gross yield of two hundred and twenty-three million, leaving a net of one hundred seventy two million on that combination; that assuming a diversion from the Merrimac river of all in excess of twelve hundred cubic feet per second, a yield equivalent to that obtained from the Ware-Swift project can be procured; (1973) that if no diversion is made except in excess of twenty-three hundred cubic feet per second from the Merrimac, the yield to the District will be only one hundred and seventy-two million; and that this assumes one hundred percent coordination in turning the water of the Merrimac river into the distribution system during the period after the Ipswich storage is filtered when the flow of the Merrimac permits continuous pumping under the diversion stipulation; (1975) that this high reservoir in the Ipswich is impracticable because it has such a large area of shallow flowage, because it consists of an elongation which is an enlargement of the channels for some ten miles upstream; that it is absolutely an unfeasible reservoir from a practical standpoint; that if one assumes that diversion must be intermittent from the Merrimac because of stipulations of a downstream flow, then very large storage is required, and there is no opportunity for such major storage in eastern Massachusetts;

that in order to get such major storage one must go to the western hills; (1976) that under the Merrimac-Ipswich scheme, the Ipswich reservoir would be filled each year in the spring; that in extreme dry years, in order to conserve the Wachusett supply, the Ipswich reservoir would be pumped down substantially to a point where large areas, two or three square miles, of wet soggy land would be exposed and where rank vegetation would grow during the exposed period—an ideal condition for mosquito development; that his conception of the damage is not limited to just the land uncovered or the land immediately adjacent, but that it would extend for miles and the entire surrounding country would be depreciated in value for habitation; that, if thirty day storage is kept in the so-called Hazen reservoir, the net yield to the district would be about (1977) one hundred and forty million gallons per day instead of a hundred and seventy-two million gallons per day; (1979) that, trying to view the problem as an engineer responsible for the actual carrying out of the work, it is his opinion that there is always the shadow of possible abandonment of this entire Merrimac scheme at sometime within fifty years, due to increased growth in the valley of the river; that there is no comparison as to the comparative quality and desirability of the raw water from this source and from the Ware river project; (1980) that it is entirely possible to get a safe water from the Merrimac river by the proposed treatment, assuming the highest grade of supervision; that there is a danger of breakdown perhaps at long intervals whereby there might be some water get by that would not be safe; that there will be during the summer season the continual probability of tastes and odors, which would make this water unacceptable intermittently to the consumer; that there is a particular danger of industrial wastes on the Merrimac, which, if they do not exist today, may develop at any time and which will produce tastes and odors which are very difficult to remove by treatment and which are simply emphasized by chlorination, due to the formation of chloro-phenols, which are even worse than the original taste and odor; that the Merrimac-Ipswich scheme

involves to a maximum degree the human factor, and compared with the Ware-Swift as an operating plan, is not in the same class and cannot be made so; (1981) that he is speaking of the Ware-Swift water with no treatment except storage in the Wachusett reservoir; (1982) that he has no hesitation at all in saying that he would chlorinate the Metropolitan District supply today if he were responsible for it; that he thinks that the Ware-Swift water would need no treatment other than chlorination.

He further testified (1982) that the Fifteen Watershed Plan as presented by Mr. Jacobs (1983) includes in the order of their proposed development, the filtration of the South Sudbury river, the Shawsheen-Ipswich development, the Lower Sudbury-Hobbs Brook development, the headwaters of the Assabet, and filtration of the Wachusett supply; that it is obvious that this project is to be substantially discounted by the multiplicity of sources and the resulting burden of co-ordinating them in actual use; that the project involves thirteen different new catchment areas; that it involves nine new pumping stations, widely separated and four filtration plans, widely separated; that of the water to be obtained in the Assabet development, about 80 percent is to be pumped and only the balance is procured by gravity; that the five Assabet pumping stations having two hundred fifty-three million gallons per day capacity must pump against an average head of ninety-two feet, which is a pretty high lift for raw water; that, in his opinion, no detailed analysis is necessary to show that this widely scattered small unit scheme is substantially discounted in value by that very fact; (1985) that this multiple unit project will give about seventy five per cent of the yield obtainable from the Ware Swift, which means that it would fail by some seventy million gallons a day to meet the requirements of 1970, and demonstrates the necessity of going to the Connecticut Valley or taking the balance from the Merrimac; that in figuring the yield from these sources he has not taken into consideration the future requirements of other communities in eastern Mas-

sachusetts outside of those provided for by the Ipswich and outside of those contemplated to be taken care of by the Metropolitan District; (1986) that if these communities made an additional future demand the yield will be correspondingly reduced and would emphasize that much more the necessity of going either to the Connecticut or the Merrimac for the balance; (1987) that in his opinion the yields estimated by Mr. Jacobs assume greater utilization of the flood runoffs in the Assabet, Shawsheen and Ipswich than would ever be practically possible where a large proportion of the water must be pumped; (1988) that the Lower Sudbury-Hobbs Brook reservoir suggestion contained in the fifteen watershed plan is absolutely impracticable; that Framingham is a large industrial town on the junction of railroads and is on the Sudbury river; that in his opinion the proposal to include the Lower Sudbury as part of this scheme is simply a very good illustration of how hard put to it the proponents were in order to build up the yield necessary in their endeavor to compare with the Ware-Swift; (1989) that this Lower Sudbury scheme must be omitted; that Hazen omitted it, and the water supply investigating commission, to which Mr. Hazen reported, recommended that it be dropped from further consideration; that if this Lower Sudbury scheme is omitted it reduces the yield to the District from the project to about fifty percent of that obtainable from the Ware and Swift and again emphasizes the absolute necessity of resorting to the Merrimac or to the Connecticut Valley to make up the supply; that the quality of the water on the Fifteen Watershed Plan would be less hazardous than the Merrimac; that there can be a safe supply obtained from this project up to the quantity he has named; that it will be a supply, however, which carries the necessity of continuous high-grade supervision, as it is open to all the hazards involved in the human factor; that, in his opinion, there will be tastes and odors periodically which would make the supply decidedly less acceptable than that obtained from the Ware and Swift; that this opinion is based on the assumption that the Lower Sudbury is included; (1991) that it is pos-

sible to pump water from the Shawsheen River into the head rivers of the Ipswich River; that he thinks there is better water propably in the Ipswich from the point of color; that the Ware-Swift waters with chlorination would be a decidedly better water from the standpoint of the water-works man than the Fifteen Watershed Plan with the complete treatment suggested by Mr. Jacobs; that he thinks that the multiple unit water problem can be made safe; that the risk or hazard is not as great with that supply as it is with the Merrimac; (1992) that he thinks that the conditions on the Ipswich and on the small shallow reservoirs on the Shawsheen and particularly the use of the lower Sudbury below the sewage disposal plants of Framingham, Natick, and Marlboro will at least result in the development of conditions resulting in periodic tastes and odors; that the supply would not prove acceptable to the consumers, at times; that there is no question but that the Swift River Reservoir site is one of the most magnificent sites that engineers have knowledge of in Massachusetts; (1996) that he is in favor of going into the Connecticut Valley watershed for water supply; that during the last 20 years he has not had any personal relation to the Metropolitan District; that he has knowledge of the situation the same as any engineer obtains by reading the joint report of 1922 and of the so-called Water Supply Investigating Commission of 1925; (1998) that he agrees that the Merrimac has ample supply of water for the immediate future but that that is not the problem involved in this case; (2000) that the supply to be obtained from the Merrimac would be sufficient for the usual and practical needs up to the year 2000; that he agrees that there is no doubt that the water of the Merrimac River could be used for the water supply of the Metropolitan District if necessary, provided it were properly filtered; that the clause "provided it were properly filtered" is a very large condition in that sentence; (2002) that the Metropolitan District has a very well operated plant; (2003) that if he had the responsibility of furnishing water to the City of Boston he would chlorinate it; (2004) that he doesn't

object to chlorination in the Merrimac supply but pointed out that it is liable to breakdown; that the same liability to breakdown that would occur in chlorinating the Merrimac would apply to chlorinating the Wachusett, except that in the case of the Merrimac a highly polluted water would be chlorinated and in the Ware-Swift project there would be a water which has been proved by its record to be reasonably safe without chlorination; that from his practical experience it is true that there come times when there is a taste and color in the water that must be gotten rid of but that they are more likely to occur when taken from shallow-bottom, muck-covered reservoirs, than they are when taken from the hills; that there ought to be a higher degree of care exercised in handling and delivering polluted water than is necessary in handling and delivering water from unpolluted sources; (2005) that there is very good supervision at Cambridge; that there was a shut-down there of 10 days within a month; (2006) that he has not examined the results of any bacterial analyses of water of the Ware and Swift Rivers; that at one time there was trouble in Akron, Ohio with the water supply; (2007) that a filter plant was built under his immediate supervision for the purpose of purifying the water; that the river used was the Cuyahoga, which had all the characteristics of a midwest water—high turbidity during floods—and was absolutely impossible to use in its raw state; that it looked like yellow mud, in the time of flood; that the filter plant has been what could be called satisfactory; that in connection with the Akron water supply, he arranged for the aeration of the water; that aeration helps sometimes in removing color and sometimes it doesn't help; that in Akron it has been used but very little; (2008) that he is not prepared to say whether or not it has been used satisfactorily when necessary to use it but that during the first year he thinks there was evidence that the aeration broke down some of the micro-organic cells and that the oils were brought into a more pronounced condition; that sometimes aeration is successful and sometimes not.

EDWARD L. WOODWORTH, called by Massachusetts, testified, (1928) that he is an attorney at law and a member of the bar of New Hampshire and Massachusetts: (1929) that he is counsel for various mills and the Boston and Maine Railroad; that he has examined the statutes and decisions of New Hampshire with respect to the flowage of lakes and ponds forming the head waters of the Merrimac River; that the Court of New Hampshire has declared that all ponds of ten acres or more are great ponds, and that the title to the pond and to the soil underneath the water from the high water mark is in the state; (1930) that as to those great ponds, in his opinion the law of New Hampshire is that the owner of the privilege at the outlet of such a great pond can use the pond for reservoir purposes and can draw it down certainly to low water mark, subject to the general principle that everyone who uses any sort of water right must make a reasonable use thereof in view of the other needs of other persons; that subject to the rather indefinite, but thoroughly established principle of reasonable use, which might under some circumstances permit the owner of the outlet to draw the water below low water mark, he would say that it would require a grant from the State to permit any substantial drawing down below low water mark; that the State, as the trustee of the water in the ponds, and its Legislature, as representing the people who are the beneficiaries, might agree upon even an extinguishment of the right; that (1931) the water should be maintained at least as high as low water mark, but that any injury that resulted from such drawing down below low water mark would require compensation to the persons injured; that with respect to the possibility of draw-down between high and low water mark and with respect to the use of water between high and low water mark and the extent to which that matter is subject to legislative regulation by the state, with or without compensation, his opinion is that the use of the water between high and low water marks is subject to reasonable regulation by a statute passed in 1911; (1932) that in his opinion the law is that the use of the water between high and low water mark is subject to reasonable regulation by statute passed in 1911.

MR. WESTON E. FULLER, an expert witness called by Massachusetts, testified (2017) that, with Mr. Barbour, he had worked out certain results with reference to the two schemes proposed by Mr. Jacobs—first from the Merrimac and second what Mr. Barbour called the "multiple unit project"; that all the results to which Mr. Barbour testified were the joint results of his work and that of Mr. Barbour—that he has heard all of Mr. Barbour's testimony and is in agreement in the conclusions and opinions to which he testified; (2018) that he agrees with Mr. Barbour that the 200 million gallons per day from the Merrimac was not feasible, due to the fact that there would be some restrictions placed by the War Department upon the use of the low water flow of the Merrimac River; that in his opinion the Ware-Swift development is very much superior to the Merrimac River, treated as proposed by Mr. Jacobs; that he believes the Ware-Swift represents about as good a water development as can be made, coming as it does from a high, sparsely settled section of the country, which it may be confidently expected will last for an indefinite period; (2019) that he thinks the future is to be considered even more than the present in constructing these water supplies, and he gives that opinion in the light of trying to get cities to develop a good water supply; that after cities have spent money in developing a poor water supply it is very difficult to get them to change; that in his opinion this opportunity to secure an unpolluted supply from a district which in all probability will not grow, in which the inhabitants will not increase, should never be neglected for the sake of taking a supply from a district on which the population is absolutely certain to grow, and which is out of the control of the State of Massachusetts; that he believes it would be a grave mistake to develop small supplies on the Assabet, the Shawsheen and the Ipswich, which are close to the Metropolitan District, and which are certain in the future to have large increases in population; that from the Ware-Swift project you get an unquestionably good raw water to start with—that it may be advisable to chlorinate it merely for additional protection,

although he doubts if that is really necessary; that the other supply (the Merrimac) can be made safe by the most careful purification methods, providing everything works as it is planned (2020) to work; that from his own experience he knows that filter plants do not always work as they are planned —that there are break-downs, that things happen, that there is always a chance of carelessness on the part of operators, and many other things may happen that make a polluted water objectionable when a good supply can be obtained; (2021) that he agrees with all the conclusions to which Mr. Barbour testified, whether or not he has been specifically asked about them, with the exception of one error, which he corrected; (2024) that waiving, for the present, the possible requirements of the U. S. War Department, the effect of the abstraction of something like a quarter of the flow of the river at low water from the Merrimac at Tyng's Island will be a very serious matter; that he believes it takes the best of the power away; that, in other words, (2023) it takes away the power which is continuous and can be used continuously throughout the year; that 200 cu. ft. per second diverted throughout the day means 600 cu. ft. per second or more in the working period, the water being used for only some 50 hours; that furthermore, under certain conditions it would be necessary to draw down the pond, which would cause a very heavy damage to the power as that pond is used to save the water during the dry period of the year, so as to use it during the day hours; that he believes that $5,000,000 is a low figure for damage to power on the Merrimac development, and that that is the minimum amount; that he is surprised that Mr. Uhl used a figure of 5 mills per kilowatt hour for surplus power, because (2026) it is not possible to obtain 5 mills in other parts of the country; that in Western New York around Cohoes, where there is an interchange, the value is as low as 1½ mills, 2 mills and 3 mills; that he remembers about the typhoid epidemic in Plymouth, Pa., as it is a well-known case, but does not remember the details; (2027) that he is quite sure they did not have a supply like the Ware-Swift—that it is possible for

an epidemic to come from a house on the watershed of a small reservoir; (2028) that such an epidemic is perfectly possible with a small reservoir where there is very little water compared to what enters; that a happening like this is not going to occur in a reservoir with a period of storage obtained in the Ware-Swift; that it is not going to occur with a long period of storage; that he does not think anyone can say today how long a storage period is necessary for the Merrimac water—that he believes most of the talk about the period of storage is based on the London experience, where they put water into a reservoir and leave it alone for a definite period; that his recollection is that the period is something like 35 to 40 days, at the end of which period they draw it out and filter it; that better results are obtained than if they put it in a reservoir and used it; that the London water is safe—that he has not heard anything to the contrary; (2029) that if the Ware-Swift as a water supply for Massachusetts was eliminated from the picture, it would be possible to get a supply from the Merrimac, which ordinarily would be safe; that this supply would be worse than that of Washington, D. C., because the river is much more polluted than the Potomac River; that they had storage before purification in Washington; that if there was furnished a 60-day storage of water from the Merrimac, and then this water was put through a rapid sand filter, then chlorinated, it would give Boston a safe water, if things work all right; that all over the country there are many river supplies, but that is a case of having nothing else that is better.

"Q. I am eliminating the Ware and Swift. If you had a section of the country like eastern Massachusetts, and you were in the same position that you would be in if you were on the Mississippi River where you did not have anything else to go to but the eastern supplies of Massachusetts, you could produce a safe drinking water for Boston, couldn't you? A. Under ordinary conditions I think you could, but I would says this—that because

most people have to live in tenements it is no reason why you should make everybody do so.

"Q. If you had your choice, where you could go to a supply that was very slighted polluted and one which was polluted, you would go to the one which was less polluted? A. I would go to the supply which was satisfactory in its original condition.

"Q. If people have to have a water for drinking purposes and cannot go to sources which are not polluted, you can take the water at their door and treat it so it will be safe for human consumption, can't you? A. Yes, you can do that under ordinary conditions, but there are the chances of its falling down."

That he believes that there is an extremely remote chance on the Ware-Swift development of somebody getting some typhoid germs in the water, and that storage and chlorination would eliminate danger from that; that it is the simplicity of operation of the Ware-Swift that insures the supply of being good quality at all times;

"Q. Mr. Warren: And the question in your mind is whether, there being no physical obstacle to getting a good water, there should be interposed some legal compulsion requiring the Metropolitan District to take a poorer water— is that about the question? (2031)

"The Witness: That is the way it seems to me. It seems to me it would be a great mistake to force a metropolitan district to take an inferior supply under the conditions which exist."

that his personal opinion is that the supply for Eastern Massachusetts ought to come from sources similar to the Ware and Swift, and these will be from the western part of the state; that such a possibility is in a period beyond 1970; that the tendency of the estimates which he makes himself, and that others make, is to over-estimate a little; that he believes the estimate for Eastern Massachusetts is a good one; that the supply may suffice only to 1970, but he thinks it would go a few years beyond; that if this water supply is planned for

1970, the plans for a new supply would have to start 10 or 15 years before, if the population increases as fast as it has; (2032) that if Massachusetts did go to those other tributaries of the Connecticut River and the War Department required Massachusetts to let down more water than naturally went into the Connecticut River in a dry season, conditions on the Connecticut River would be benefitted; (2033) that while there is no way of guaranteeing this release, the War Department has treated the State of Connecticut pretty well so far.

HARRISON P. EDDY, an expert witness for Massachusetts testified (2039) that he had done work on the Merrimac River for the cities of Manchester, Concord and Laconia or individual corporations within those cities; that while he was familiar with the lower part of the Merrimac River, he had never done any professional work in that immediate neighborhood; that he thinks there is a very serious difficulty in controlling pollution in the Merrimac River and in the Nashua River in both New Hampshire and Massachusetts; (2040) that the Nashua River lies largely in Massachusetts; that in Massachusetts where authority can be obtained for controlling the pollution, it is almost an impossibility to accomplish it; that he would cite his experience in the city of Worcester as an instance of this; that the City started sewer disposal works in about 1895 or 1896 costing perhaps a million dollars; that within the last five years another mandatory statute was passed in which the City was compelled to spend more money; (2041) that, as he has been over the Blackstone River below Worcester, it seems just as offensive and foul, if not more so, than it was when he went to work for the City in 1891; that (2042) the reason for this is because the disposal of sewage is the last thing that anyone has any interest in; that it is easy to get money for streets because the people see them and use them, but the difficulty of getting money and appropriations and support for sewage treatment is exceedingly great; that his firm built a sewage disposal plant for the City of

Fitchburg starting in 1914; that the plant has operated well but the industrial waste is still going into the river and in his judgment it is almost a practical impossibility to clean up that river; that the Merrimac River as a natural waterway is an enormous asset to the State of New Hampshire for industrial purposes, and that in his judgment it will always be used as an industrial stream; that it is inconceivable to him that the Merrimac River will ever be cleaned up in a sense which one would expect in order to make it suitable for water supply purposes; (2043) that the river above Tyng's Island is a series of mill ponds; (2045) that there is no question but that bacteria discharged from the sewerage system of Laconia or any of the cities lower down in New Hampshire would reach Tyng's Island in a virulent form; that the total population on the Merrimac River drainage area above Tyng's Island is 229,400 or about 58.4 persons per square mile; (2046) that the watershed up to Concord, New Hampshire, shows a large population per square mile; that in the balance of the watershed it showed a very different figure because it is up in the hills and mountains; (2047) that he estimates the total amount of domestic sewage emptied into the river is eleven million gallons per day in New Hampshire and five and one-half million gallons a day in Massachusetts; that these figures refer to domestic sewage; that at a very low flow of 500 cubic feet per second there would be 5 per cent sewage in the river water under present conditions and by 1970 he would expect there would be at least double that or 10 per cent; that in other words, at the present time there would be something like 2/3 of a teaspoonful of sewage in a glass of water; (2048) that according to Mr. Knowles' report in 1917 there were 116 industries on the Merrimac River above Tyng's Island; that a recent investigation showed a total in the same area of 75 industries engaged in work which naturally results in the production of liquid wastes; that the aggregate volume of wastes according to Mr. Knowles' report was 25,000,000 gallons a day in New Hampshire and 34,000,000 gallons a day in Massachusetts; that Mr. Knowles also gave the quantity of solids in

these industrial wastes as 1,000,000 pounds per day; that the proportion of industrial wastes in the river (2049) for 500 cubic feet per second would be nearly 19 per cent or, in other words, in a tumblerful of water about one-fifth would have been industrial wastes; (2050) that it is certain that the industrial wastes in the Merrimac Valley will at least double; that he bases this estimate on the fact that there is available a large, abundant supply of water for industrial purposes, which will become more scarce in the future than it has been in the past, and he believes his estimate is a conservative one; (2051) that the third source of information regarding industrial wastes was Exhibit C-34 which estimated the total population equivalent as 232,900 which he thinks is a very moderate estimate; (2052) that he believes that the establishment of a single industry upon the Merrimac River might well contribute as much industrial waste as has been allowed in this latest estimate; (2053) that the processes of self-purification go on very slowly in the winter time as compared to the summer; that the discharge of sewage and industrial wastes of an organic nature into the water in the winter time is like putting those organic compounds into a refrigerator; that where deposits of such materials are made during the cooler portions of the year, in the summer time when the temperature is higher, the entire accumulation of cold weather swings into activity and creates a very great demand on the natural purifying processes of the water; (2054) that the processes by which sewage and industrial wastes can be purified are many, but the efficiency of such treatment is very low; (2055) that it is not practically possible to obtain anything approximating perfection in the purification of the sewage; that "to produce a satisfactory water for domestic supply calls for the purification of the water rather than or in addition to the purification of the sewage and the wastes"; that he has estimated or considered the pollution of the Merrimac River at Tyng's Island from the point of view of offensive conditions; (2056) that he questions whether conditions at Tyng's Island, from the standpoint of human sewage alone are objectionable, because, first there is a measure

of self-purification in the river which tends to improve the situation, and in the second place the low flows are of very short duration; that a consideration of the dissolved oxygen in the river indicates that the river is approaching a condition in which it might be considered as being somewhat objectionable at certain times; (2057) that he is still considering human sewage alone; that if the industrial wastes are taken, as mentioned in Exhibit C-34, as double the quantity of sewage, then this leads to the conclusion that, with both human sewage and industrial wastes considered, the river is a grossly polluted stream from the point of view of a water supply; that the average of five samples from July 17 to November 16, 1923, indicate that the river is seriously polluted with sewage and industrial wastes; this average showed 57.5 saturation and the flow was 1795 cubic feet per second; (2058) that the records taken at the intake of the Lawrence filter plant, obtained through the State Board of Health, showing the B. coli index per 100 cubic centimeters from 1918 to 1929 were as follows:

1918	10,300
1919	19,400
1920	11,800
1921	19,000
1922	6,900
1923	7,200
1924	6,600
1925	5,700
1926	6,700
1927	4,500
1928	4,200
1929	3,400

(2059) that there is a decided drop in the records of B. coli tests since 1921 and that may be explained by the effect of some particular kind of industrial waste; that he believes that bacteria will reach Tyng's Island in virulent form; (2060) that he has the following conclusions as to the quality of river water at Tyng's Island: (1) the river is only moderately high in color; (2) at times of flood and storm it is quite turbid

but not seriously so; (3) it is heavily polluted with sewage and industrial wastes and intestinal organisms are certain to be present in virulent form; (4) at times it is likely to contain products from gas works and paper mills and in the future he thinks it is almost certain that such compounds will be present at times and be likely to cause trouble with purification processes; that phenol is the substance from gas works which gives water its disagreeable hospital taste and smell; that substances from paper making are very persistent; that in his judgment the Foster-Martin Reservoir will not be anywhere nearly as effective as the figures indicate because (2062) the natural current due to the flow is certain to produce a short time of detention for much of the water and at times the effect of wind is very likely to carry the water very directly to the outlet; that he has observed this effect which is frequently called short circuiting due to wind many times in bodies of water, for instance, in the water of Lake Ontario at Rochester; (2063) that in his judgment the following precautionary measures of purification would be required to make the Merrimac River as satisfactory as possible for use as a domestic supply:—he would use aeration at the outset and principally chlorination and the latter should be used all the time with some exceptions possibly. Then he would provide coagulation, sedimentation, filtration and finally chlorinati much of the time and at times post-aeration, and finally the correction of the corrosive properties by the introduction of lime in the final effluent; that he believes the difficulties of purification would increase with increasing pollution; that the character of the water is such that the growth of water plants, the algæ or plankton in the reservoir, would be very prolific and troublesome; that he had neglected to say that from time to time it would be necessary to use copper sulphate to keep these organisms under control; (2064) that other than the difficulties which he has intimated in the operation of these corrective measures there would always be the practical difficulty, due to human frailty, of having the works operated in a highly efficient manner all the time; (2065) that one of the

most spectacular illustrations of this which he knows about personally was at Detroit when there was apparently a reversal of flow or change in the current conditions which permitted sewage to cross the river and reach the water supply intake; that notwithstanding the fact that Detroit had a practically new filtration plant, this condition resulted in about 200,000 cases of (2066) intestinal disorder, yet the reversal of flow did not last more than five or six hours; that recently the Cambridge, Massachusetts, filter was shut down; that it is difficult to get information about lapses in purification plants because operators do not like to advertise them but that there are a good many lapses which constitute a serious objection to the use of a highly contaminated raw water for the supply of manufacturing water to any district; that the increase in growth of water plants in the reservoir will increase the difficulties of operation. (2068)

> "Q. What is your judgment with reference to the quality of the treated water for use as a domestic supply? A. I think it is possible to make what we ordinarily consider a safe water. The bacteria will be low usually; the intestinal organisms will be absent. If the water is chlorinated before and after filtration, that is a very good safeguard. Such storage as may be effective storage will help. (2069) Nothwithstanding that in my judgment it was a hazardous supply and one which is dangerous to adopt. If the District must use that water I think it can be purified so that as we ordinarily speak of it, it will be a safe water. I think there will be objection to it. There will be times when there will be tastes and odors but I should expect to find a condition resulting similar to that in Lawrence found by Mr. Knowles where the people objected to the use of the water, if for no other reason than because they know where it comes from. Now that has several effects. It has the economic effect which perhaps may not be material in this case, but it also has a health effect because frequently people buy bottled water thinking they are getting a safer water and yet they are getting worse than the one from the supply that they are shrinking from. . . . . Q. Well, taking all the condi-

tions into consideration surrounding this Merrimac River supply, how do you think it would compare with the present source if the present source were chlorinated? A. I think the present source would be distinctly safer, less hazardous and better. Q. That is with chlorination? A. With chlorination. Q. What do you think of the comparison of the proposed Merrimac water to the Ware-Swift supply without chlorination? A. Why, in my judgment the hazard is very much greater (2070) in the case of the Merrimac River supply. Ordinarily I think the Merrimac River supply will probably be as safe and possibly a little safer than the present supply without chlorination or the Ware-Swift supply brought in through the present works without chlorination because there is opportunity for contamination.

That he believes if the present supply supplemented by the Ware-Swift were brought into the Metropolitan District without going through Sudbury Basin it would constitute a very decided improvement; that Sudbury Reservoir is itself somewhat exposed to contamination and just before water reaches this reservoir it flows in an open aqueduct and is more or less exposed to contamination; (2071) that Sudbury water is (2072) very much better than the water from the so-called Lower Sudbury River as proposed by Mr. Jacobs, better than that water could possibly be; (2073) that the Ipswich River water itself would be a highly colored water and he would expect a very large algæ growth which would interfere with the purification process; (2074) that it is possible to make a water which would prove reasonably satisfactory from the Ipswich basin itself; that he thinks this plan (this is a discussion of the modification of the Merrimac scheme suggested by Mr. Kennison and Mr. Barber) with respect to the quality of the purified water and the difficulties of preparing water for consumption would be preferable to the Foster-Martin plan; that he thinks, however, there would be a serious hazard. "I should call it a hazardous water from a polluted supply much the same as in the Foster-Martin project"; (2076) that regarding the situation in the Ipswich River watershed and south of it, there is an enormous amount of through and local traffic, with

picnicking, roadside stands and all of the features which would tend to make it difficult to maintain the purity of the water in the basin; that there are a number of communities there which are growing and which in the future will grow very much more; (2077) that he believes that this Ipswich River water is very materially deteriorated by adding the Merrimac River water; that he believes the conditions are slightly better than they would be from the Foster-Martin project; that he has considered the development of the Assabet River; (2079) that of the whole Fifteen Watershed Project, the nine watersheds on the Assabet River are perhaps the best of any of the fifteen which are suggested as an alternative to the Merrimac supply; that there is very little swamp land on these nine watersheds; that it is rolling country and its natural condition is quite favorable to a moderately good water supply; (2080) that the very serious objection to it is the encroachment of the population both permanent and transient; that he thinks the water would have to be filtered and chlorinated without any question; that he has had supervision of the industrial waste disposal works of the Assabet Mills of the American Woolen Company, which are on the Assabet River, since 1913; that the wastes of these mills have been a source of serious complaint from the town of Concord, Massachusetts; that his firm has been able by various methods to control the pollution from their cloth and wool washing so that there has been no serious complaint; (2081) that the effect of the proposed diversion on the Assabet Mills would be likely to require the introduction of process water purification to produce a better water than they would receive if the water were not diverted and they would be certain to have to use an extreme degree of purification of their waste which they now avoid by the use of diluting water; that a compensating reservoir as suggested by Mr. Hazen would materially help the situation; (2082) that this compensating reservoir should have a capacity of at least 3,000,000,000 gallons; that the total amount of process water required by the Assabet Mills is about 6,000,000 gallons a day, and the volume required for the dilution of waste under present operation is about 30,000,000 gallons a day; that the Shawsheen Mills of

the American Woolen Company situated on the Shawsheen River just below where it is proposed to construct a dam as a part of the Fifteen Watershed Scheme uses (2083) between 3,000,000 and 4,000,000 gallons a day; that the industrial wastes are discharged into the sewers of the Town of Andover so that the proposed diversion would not enter into the problem of the disposal of industrial wastes; (2084) that it is possible to purify that water and turn it into water of ordinarily good quality; that he would not rank it quite as high as the upland area of the Assabet although (2085) it is possible to make a fairly good water out of it; that the taking away of the process water would shut the mill down; that at the present time the minimum flow is barely sufficient to meet their needs; that, referring to the South Sudbury project, it is feasible to purify that water and turn out a water of moderately good quality; that he would not rank it quite as high as the upland area of the Assabet, although it is possible to make a fairly good water out of it; that the water has a hazard attached to it due to its proximity to highways and settlements; that the Lower Sudbury development (part of the Fifteen Watershed Scheme) is a very unfavorable catchment area for a municipal supply; that it is subject to all the hazards of development and of transient population; (2086) that it has within it the sewage treatment plans of Framingham and Natick and also that for the City of Marlborough; that it is physically possible to shut these plants down and divert the sewage into sewers which run into Boston Harbor although the Metropolitan system is not designed to take care of this area; that the water in the catchment area including the sewage effluent would be very unfavorable for water for municipal supply; that if it must be used and the District is limited to areas east of the Connecticut River watershed there can be manufactured a safe supply from the lower Sudbury; (2087) that the watershed of the Shawsheen River is quite similar to that of the Ipswich in respect to the relatively large area of swamp land; (2088) that the watersheds are between two highly populated and increasingly populated sections, the one the cities of Lowell and Lawrence and the other Greater Boston.

Q. What are your conclusions relative to this project as a whole of what we might call the Assabet-Sudbury-Shawsheen-Ipswich Project or the Fifteen Watershed Project? A. Taken as a whole I think it is distinctly superior from the point of view of quality to the Merrimac, developed either with the Foster-Martin River or in conjunction with the Ipswich. I think it is an inferior source as compared with the Ware and the Swift or the Wachusett. I think it is a source (2089) which is going to be extremely difficult to maintain at anything approximating satisfactory sanitary conditions in the future. If Boston must use this water, I think it can be manufactured into what we ordinarily call a safe water. It is however a hazardous water from a more or less polluted source. But the pollution in my judgment is not so serious as that on the Merrimac River";

That he thinks it would be a relatively difficult project to operate; that it is a very difficult project to coordinate and utilize to the best advantage, but it is a possible source of supply; that he has considered the Swift-Ware project and thinks that this is as nearly a perfect catchment area as can be obtained in this locality; that he is not qualified to pass on the site as an engineering project; that the storage which is proposed would be very desirable; that the Swift River water has what he would call a moderate color and (2090) that the Ware is more highly colored; that if this water could be brought directly from the large Wachusett Reservoir into Chestnut Hill Reservoir, he doubts very much if chlorination would need to be considered; that the possibility of increase of potential contamination is not an objection to the Swift and the Ware; that he believes the present Wachusett-Sudbury supply an excellent one; that the water at the outlet of the Wachusett Reservoir is of excellent quality, possibly a little more highly colored than is desirable; on the other hand there is a residential development from the City of Worcester out toward this reservoir into the catchment basin now which constitutes a potential hazard; (2091) that the Sudbury reservoir is worse off in this respect; that he has made examina-

tions of the analyses of the water from Chestnut Hill in Boston after passing through the Sudbury Reservoir which indicate that this water is not as good as at the Wachusett outlet; that he has a rough method of comparing these several sources of supply in order to give a reasonably clear impression of their relative sanitary or hygienic merits and effects; that this method was developed in 1916 or 1917 by Mr. Theodore Horton and Mr. Eddy's partner, Mr. Chase; (2092) that this method was investigated by a committee of the New England Water Works Association, which reported the method; that he has scored the several supplies; first, with no storage—that is, the raw water, except that the Wachusett, South Sudbury, North Sudbury and Scituate he could not score that way because they are now stored; (2094) that the proposed Merrimac supply is distinctly inferior to the other supplies considered to supplement the present Wachusett Sudbury supply; that he thinks the Fifteen Watershed supply is distinctly inferior to the Swift-Ware but a better one than the Merrimac; that considering all of the present conditions and his conception of conditions of the future he thinks that the Swift-Ware is decidedly the most favorable from the sanitary point of view and the point of view of acceptability to the consumers; (2096) that he wishes to point out that Mr. Knowles' report (to Lawrence) which has been referred to, relative to industrial wastes in the Merrimac, was made during the War; (2098) that he believes an engineer should give weight to popular opinion in the source of a municipal supply for at least two reasons: (1) because the public is opposed to the water, either because of its color or its odor or because of knowing that it comes from a polluted source, and the tendency is to use other water, bottled water, and I think I did point out yesterday that it has been found in a number of cases that bottled water is actually inferior to the municipal supply; that is the sanitary reason; and (2) the financial reason: that, as was pointed out in Mr. Knowles' report of 1917, when he found that the people of the City of Lawrence were paying at least $70,000 a year for bottled water; that with a city situated as Boston is, a center to

which travelers come, many people inquire with reference to the quality of the water, and that if the local impression is unfavorable it is decidedly detrimental to the interests of the city; that he should give and has given a number of times consideration in that manner; that it is quite common for municipal supplies to be taken from rivers and lakes which receive sewage and industrial wastes; that Cincinnati, Louisville, and a number of smaller cities (2099) have taken water from the Ohio River; that the Ohio River drains on enormous area and the concentration of pollution at Cincinnati is perhaps a third or a quarter of what it was in the Merrimac some ten or fifteen years ago; that the more highly turbid waters of the central west are more readily purified bacterially than the clear waters are; (2100) that cities in the middle west take water from the Great Lakes, Cleveland, for instance; that Chicago takes more or less water from Lake Michigan; that notwithstanding the great effort which Chicago has made to keep the sewage out of the Lake the water is somewhat polluted; that the performance of the purification plant in the Ohio Valley has brought about a very great improvement in the quality of water supplies and "I think the advance in purification of polluted waters is largely the cause of reducing the prevalence of typhoid fever in the country. It is not by any means the only cause, but it is an important cause;" that he considers it advisable to go to an upland source when it is available, a practically unpolluted source, because of the hazard of manufacturing a municipal supply out of the raw product which itself is (2101) polluted and is dangerous; that the water supply of the City of Rochester is an instance of this, where the city took water from Lake Ontario into which the sewage of the city was discharged and he was one of the Commission which recommended that the City go to an upland supply in Honeoye Lake; (2102) that the Ontario water is vastly superior to the Merrimac from bacterial counts although in a lake water there is the hazard of sewage being carried intermittently by the wind to the water supply intake; that he thinks it is reasonably necessary for Massachusetts to go to the Ware and Swift River for a supply for Boston.

"Q. Taking into consideration your experience do you make that answer even though the water from the Merrimac can be made safe? A. Yes, I do.

(2103) that Exhibit D-27 is entitled "Reasons for Favoring Uncontaminated Raw Water Supplies with Particular Reference to Introduction of Purification Processes"; (2105) Exhibit D-28, being the scoring of the water supplies of the various projects, was introduced; with reference to this system of scoring, about one-half of the total possible score depends on the initial character of the raw water before taking; that it is based upon three things: population per square mile, not connected with sewage; second, sources of direct pollution; that is, population served by sewers; third, sources of direct pollution where sewage treatment is introduced and the sewage is treated before it is discharged into the river or lake; that, so far as the part of the scoring from which you start is concerned, that is the initial character of the raw water, in any one of these three things, it is entirely irrespective of any subsequent treatment of the water and irrespective of the character of the water delivered to the consumer; (2107) that an engineer ought to have regard for the future as well as the present moment in picking out a water supply and that this fact cannot be shown by analyses; that regarding the recommendation that Cincinnati continue its policy of discharging its sewage into the Ohio River and that particular attention be given to constructing outlets so as to secure a thorough mixing of the sewage with the river water, he would make the same statements today under the same conditions; (2109) that in the same report the witness stated; "While there may be sentimental objections to the discharge of sewage into this river from which a domestic water supply was taken, such objection should not prevail against reason and experience which demonstrates that this water, when properly treated, is an acceptable and potable water for domestic consumption;" (2111) that he also states in that report "the number of bacteria removed in the settling reservoir by the process of coagulation and by mechanical filtration is so great that scarcely one per-

cent of those present in the raw water appear in the effluent from the filters; whenever deemed necessary the effluent from these filters can be further treated with calcium hypochloride, which appears to destroy practically all of the remaining bacteria. A careful study of the bacterial tests of the water treated at the Cincinnati water filtration plant indicates that this plant is capable of successfully handling any water likely to be delivered to it under present conditions;" that most of the cities along the Ohio River discharge their sewage into the river, and that this water when properly treated is a safe and potable water for domestic consumption; that (2110) the cities along the Ohio cannot continue indefinitely to grow and discharge their sewage and industrial wastes into the river without producing a degree of contamination which will overtax the capabilities of the water treatment plants; that at present these plants are not overtaxed and the data on hand does indicate that the health of riparian communities is injured by the use of the river water where a reasonable effort is made to protect the water supply by efficiently treating the water, a measure which should be adopted even if sewage and industrial wastes were not discharged into the river; that Cincinnati and Louisville (2111) did have storage of their water in 1912 and 1913 and that (2113) the result obtained by something like five days storage on the fill and draw principle with two reservoirs produced an excellent result from a bacteriological standpoint; (2113) that forty or fifty years from now it may be that we won't drink any water unless it is scientifically treated; that he would say that is almost the case today; (2114) that the witness built a plant at Greenwich, Connecticut, which comes the closest to a supply which has pre-aeration,—pre-chlorination, storage for sixty or ninety days or thirty, coagulation, sedimentation, filtration, chlorination, and post-aeration; that all that is practically all that human nature can possibly do; (2115) at the present time to make polluted water safe; that he thinks they are getting very good water in Greenwich.

GEORGE W. FULLER, expert witness for Massachusetts, testified (2123) that, as to the *relative desirability* of water from a pure source, as compared with a source from which water requires purification, the source which is pure is preferable to the source which relates to pollution; that the reason of that goes back to his training at the Institute of Technology in 1888 and 1890, when he was a student in the classes of Dr. Brown and Dr. Sedgwick, chief chemist and chief biologist and chief bacteriologist, respectively, of the Massachusetts Board of Health; that it was a time when the so-called germ theory was known to a few of the leading scientists, but was not widely known even among the medical profession and those interested in public health matters; that he was taught in the Institute that pure water was better (2134) than purified water, and it was mentioned in the class room that it was quite a similar situation to dealing with human character, and the statement was made that innocence is better than repentance; that he had a chance to see that viewpoint set forth very clearly in his days in Germany, in and around Berlin, where they had those epidemics of typhiod fever, and where the medical profession made a very pronounced stand against the engineers who were seeking to filter certain ground water supplies in order to gain continuance of the surface water supplies rather than to get water from an underground source; and that was a marked feature in that viewpoint of the water works people, both the viewpoint of the medical people, who were sitting in the reviewing capacity, and also the engineers; that it was accentuated two or three years later when an outbreak of cholera occurred at Hamburg, which had a great deal to do with the development in this country, and which was really the basis which caused the agitation, consideration and final adoption of a program for the filtration of the Merrimac River; that it was the best they could do under the circumstances, but it was pure water rather than purified water that was the prevailing view in this country, in Massachusetts, and in Central and Western Europe; that an upland, gravity source of supply is preferable to a source receiving domestic and

manufacturing (2135) waste from a populous valley; that the element of cost ought not to be a factor within the range of negotiable limits of cost; that by negotiable cost is meant that a water supply which is not satisfactory to a community causes people to spend relatively large sums of money for bottled water; (2136) that the available barrier or means of defense available to water supply engineers as a measure for offsetting the pollution of public water supplies are:

(1) Avoidance or diversion of pollution at source.
(2) General control of domestic wastes by patrolling watershed.
(3) General control of industrial wastes by patrolling watershed.
(4) Treatment plants for domestic and industrial wastes.
(5) Self-purification in streams, lakes, or storage reservoirs.
(6) Water filtration, including coagulation.
(7) Water chlorination alone or combined with filtration.
(8) Algicides to destroy microscopic growths, such as algae and the like.
(9) Aeration.

that there are weak links in each of these barriers in each instance except perhaps the first, where you may get a ground water supply (2137) from deep wells; that there are also a few instances where waters are obtained from completely uninhabited watersheds such as the Birmingham watershed in the midland of England; that excepting this first instance you deal with the human elements in all of the rest and that they come into the picture with various degrees of intensity and with various degrees of frequency; that in regard to patrolling by policemen in respect to domestic wastes, there is a great deal that can be done by directing people to see that privy vaults are not only installed, but are used; that in regard to industrial waste, patrolling is very helpful but it is less successful than in the case of domestic waste because of varying load factors; that the patrolling system is subject to human weakness and

(2138) while the human element can be corrected by changing patrolmen, this situation is not entirely controllable by the men in charge of the watershed protection no matter how efficient a particular man may be; that is the difference between theory and practice; that in the case of sewage disposal beds, he knows of instances where holes were put through filter beds to an under-drain so that the sewage would go down through the surface and make an exit; that (2140) it is difficult to get industrial wastes under thorough control; that on the Merrimac River there is marked purification in the various mill ponds from Lowell up; that while there may be a removal of from 90 to 95% of impurities at certain times in the year, there will come times when the flood will not only move quickly through the mill ponds, the industrial and domestic waste entering the river, but they will (2141) sweep up the accumulation of impurities from the day or a week before, so that at some point like Tyng's Island there would be more impurities in the Merrimac River water than would come from any average condition as to the volume of waste and average flows; that regarding filtration and coagulation, there are elements which may constitute weak links—the fidelity of operation of the attendants in the amount of chemicals which they apply to match up with the quantity of water is apt to cause difficulty; that (2142) it is difficult to put in the proper quantity of chlorine to prevent or kill microscopic growths because on the one hand with too small a dose there is not a creditable performance in killing off the objectionable bacteria, on the other hand with too large a dose there are created objectionable tastes so that men are rather inclined not to over-dose and sometimes they under-dose; that aeration will do a great deal to cut out objectionable tastes but there are traces of oils with unpleasant tastes which are broken by aeration; that "speaking generally of this list of barriers, they are all powerfully helpful, but there are none of them fool-proof; they all have weak links. The water purification plant seeks to use them as advantageously as it can, but just because they are part of a water supply project it is not correct to say that the effects will at all times be that which it is theoretically possible to

state"; that it is a fact (2143) that the gas house wastes at Manchester, a city of 80 or 90 thousand people, are going into the Merrimac River and that those phenol wastes, certain products from gas house wastes, will combine with chlorine and will produce a so-called medical flavor in the water; that this is bothersome and interferes with the suitability of a good many supplies in the minds of the people; that the most serious thing in regard to this Merrimac River water supply is the fact that (2144) there is a wood pulp mill in the Town of Lincoln, New Hampshire, some 114 miles above Tyng's Island which is turning out about 74 tons a day of cellulose wood pulp; that the dry bases and other wastes of cellulose produces a black and bad behaving product which when present in sufficient amount will interrupt and prevent the action of coagulants in purifying the water; that this is a thing which might explain what Mr. McCarthy said in regard to inability to coagulate the water of the Merrimac River at Lawrence; (2145) that a similar waste from a wood paper mill makes the water at Richmond, Virginia, 240 miles below, incapable of coagulation; that that to his mind is the weakest link of any performance of any projected water purification plant in the Merrimac valley; that (2146) in discussing industrial wastes he has found very striking variations which lead him to be very cautious about drawing too strong conclusions about what you will find on any particular day or year; that (2148) the people in charge of purification have to adopt different methods to meet the varied types of industrial wastes; that

> "you would have to adjust your treatment procedures to put up factors of safety theoretically that would be adequate to deal with the waste products you would get at any one time. In other words, it is the weak link in the chain that counts, and your process—your procedure—ought to be strong enough so that there will be no weak links. And by that I mean to get a process that will do the trick every day in the year and not have it break down for three or four weeks, as Mr. McCarthy was telling about the other day—three or four consecutive weeks—when you do have something that causes the coagulation of water, for instance, to go wrong."

"Q. Now, the wastes in the Merrimac Valley found at present necessarily are no criterion of the wastes in future years? A In my opinion they are not. Any proposition that deals (2149) with a water supply from now on to 1970, you cannot take too literally the records of analyses of observers as to what comes in from industrial plants and draw conclusions which will be a safe guide for that which may be expected during the next forty years. That is not a safe thing to do.

Q. From an administrative standpoint, what particular weaknesses, if any, do you see in keeping wastes under reasonable control with regard to pollution of the Merrimac River supply? A. Well, from the standpoint of a Massachusetts project—a Metropolitan District project—there is no jurisdiction by any Massachusetts authority in any other State and, in fact in this particular state, since my own contacts in 1890, the Merrimac River and the Connecticut River were exempted from the jurisdiction of the Massachusetts State Board of Health under the Act which created its power to control the purity of inland waters. I think that is still in effect but you will have to ask somebody else about it. That is the understanding."

that (2150) a water supply project having the Merrimac River at Tyng's Island as its source ought to have 60 days effective storage which will be actually free from the readiness with which water sometimes comes from the inlet of a reservoir to the outlet; (2151) that the fact that Mr. Kennison's plan had only one reservoir is a weakness from an operating man's standpoint; that in order to put these paper mill wastes on the basis of definite control, it would be very important to provide two storage reservoirs which could be pumped into in rotation, and that the water in one basin would actually be retained for say a period of 60 days;

(2151) "Q. In your opinion, how does the quality of the Merrimac water, from Tyng's Island, after it has been stored and purified so far as practicable, compare with the water of the Swift River after the latter has been stored and chlorinated? A. It is inferior.

Q. How does the Merrimac water, treated as I have stated, compare with the Ware-Swift water without filtration of the Ware-Swift? A. I consider it inferior.

Q. How does the Merrimac water, treated as I have suggested in the previous questions, compare with the Ware-Swift water, if the Ware-Swift water has neither filtration nor chlorination? A. That is somewhat debatable, because personally, I believe the water coming from the Wachusett reservoir ought to be chlorinated, as a matter of precaution, not that the vital statistics or the analysis show that it is particularly necessary. (2152) I am rather puzzled also to know just how to answer that, in that if you can get the effect of these wastes that I have been speaking about, these pulp mill wastes and these phenol wastes, under control by a sufficiently large storage reservoir, that is one thing, but if you are going to have the breakdown of the coagulating that makes an element of risk, and I do not know what the future may bring as to other wastes of an industrial nature which may make a disturbing influence. If everything went well with the Merrimac project, why, I should say that it would compare very favorably with the unchlorinated, unfiltered water from the Wachusett reservoir receiving the Swift and Ware water, but that question of creditable performance year in and year out, day by day, on the Merrimac River, is subject to debate in my mind and is a serious question."

(2152) that regarding his views with respect to the Merrimac and Wachusett reservoir scheme in 1895, he knows a great deal more about the shortcomings of purification processes than he did in 1895, although he has had a great deal to do with purifying arrangements for public supply where they cannot get water supplies from unpolluted sources; that the improvement (2153) in purification arrangements applies particularly to the use of chlorination; that more is known about trouble from phenol and paper mill wastes; that a pure source is decidedly preferable and within the range of cost is certainly the thing to do; that (2154) he has found a general antipathy on the part of the public towards the use of water from highly polluted sources; that he considers it appropriate for the Massachusetts authorities to attach decided importance to such a view; that on the question of allocation of sources of water

supply, it is customary for recognition to be given to the needs of industries and small communities in the general locality from which there is proposed to be derived a water supply for a large city or water district; (2160) that from a practical engineering standpoint Boston should go to the Ware and Swift for its supply, having regard of all of the circumstances;

"THE MASTER: I would like to know directly, in your own way, what you think of the Merrimac River supply for the Boston Metropolitan District.

THE WITNESS: I think it is a very poor one, I find it has weak links that you could not control at all times, and when those links give away you are going to give them unsatisfactory water.

(2161) THE MASTER: Looking at the future, 30 years ahead, and considering the Merrimac with reference to that feature, what do you say?

THE WITNESS: Well, I think that it becomes then less and less desirable because here is a valley which has been devoted exclusively to various industries, which has an established labor market, an established set of facilities for mills and waterpower, and it seems to me it is bound to grow, that labor market is not going to go by unoccupied, and what those particular waste products may be, I don't know. Therefore, there is a question of doubt in my mind as to whether you can get a suitable water supply from the Merrimac River. But I am not looking at that, your Honor, from a standpoint of what happens within 60 or 90 or four months or six months storage reservoirs, but what will happen when those reservoirs are not behaving well and you get these slugs and paper mill wastes or other trade wastes washed out from behind these mill dams, and getting down to a point where they will actually overtax the facilities which are now available for purifying the water. In other words, it is not the average, ordinary, every day problems of treatment works in connection with storage reservoirs receiving water from the Merrimac River at Tyng's Island. It is a question in my mind what are those weak links when you got

a breakdown in the process and you give the people, by getting objectionable tastes and odors, water that is uncoagulated, in getting it markedly unsatisfactory to the consumers of the Metropolitan District, and I don't believe it is possible for anyone to say that they can be reliably treated. That is exactly the point that I want to stress in regard to these weak links, these lacks of performance of the human element, the lack of fidelity in human performance when the sleepy man at 3 o'clock in the morning lets things go wrong, the lack of jurisdiction in New Hampshire; obviously the industrial establishment is going out in trade which will let them use their industry to advantage. They are not going to control those wastes as a thing, practically speaking, that is reliable.

THE MASTER: You don't disagree with the witnesses who have testified that from a scientific view it is entirely possible to make a wholesome water out of the Merrimac flow?

THE WITNESS: Well, as a sunshiny day problem when everything goes fine, I will say I do agree, but I don't think that enough significance has been attached to the weak link when the stormy and bad-acting periods come."

J. WALDO SMITH, an expert witness called by Massachusetts testified (2165) that from 1905 up to the present time he was connected with the Catskill Water Supply Development for New York City, for the first 17 years of that time as Chief Engineer and since that time Consulting Engineer; that he had charge as Chief Engineer of that Water Supply; (2170) that in the spring of 1920 he was asked by the Department of Health of Massachusetts to take the place of Mr. Frederick P. Stearns as Consulting Engineer; that Mr. Stearns died in the latter part of the year 1919; that he is familiar in a very (2171) general way with the sources of possible water supply in the Commonwealth; that he has given consider-

able attention to the available sources of supply for the Metropolitan District; that the Metropolitan District has been the best district they have ever had; that that was due to Mr. Stearn's very broad foresight back in 1895, when he gave it such an extensive study; that Mr. Stearns was very capable and laid that district out with a broad policy which has been consistently followed; that the witness thinks that this is the reason why the Metropolitan District has been so successful; that since the appointment of the Commissioners in 1926 he has been consulting engineer of the Metropolitan District Water Supply Commission; (2172) that with reference to the size of aqueducts, dams and reservoirs, his experience is that he has never known one to be built too large and that in a great many instances they are not large enough; (2173) that he approves of the size of the aqueducts as planned and partly built by the Commission; that a gravity supply is better than pumping in a great many cases; that he does not think anyone would pump a supply if they could go to a gravity supply; that they would be willing to pay a great deal more money to get such a supply; (2174) that he would go to an uncontaminated supply with a system that could be developed within a reasonable cost, rather than to rivers carrying considerable quantities of sewage pollution and industrial wastes; (2174) that after what has been said by both the plaintiff's and defendant's witnesses in this case, he would not dream of wanting anything but an upland supply where the water was the best that could be obtained within reason; that he doesn't think there is any comparison between the Merrimac River on the one hand and the Ware and Swift Rivers on the other hand as a source of supply; (2175) that he would not want the Fifteen Watershed Scheme and that he would not give any attention to it; that he would turn down the Merrimac; that every time this water question has been up they have viewed the Merrimac River; that Mr. Stearns went through it in 1895 with a fine-tooth comb; that the Joint Board did the same thing with the same result; that another Board turned it down also; that about the same procedure was gone through

with the Assabet; that he approves what was done; (2176) that no other conclusion could be arrived at that he could see; that he regards it necessary from a practical engineering standpoint for Boston or the Metropolitan District Commission to go to the Ware and Swift for its supply; that having regard to all the circumstances and all the suggestions that have been made here of possible other sources; that everything that he has heard in this case has made him more strongly of that opinion.

Mr. Smith further testified that if the Ware and Swift could not be procured it would be necessary to get water in the eastern part of the State; (2177) that as to the size of the reservoir and of the tunnels the Joint Board recommended that they be built very ample in size and if required at some later date they would also take care of additions to that supply; that the Ware and Swift Reservoir site is very unusual; that nature has been very generous to that site and if there was only rock under the surface of the ground about 125 feet deep where the dam is to be, that would have made it absolutely ideal; that there is no pollution and the character of the soil and the topography and everything is such that a wonderful reservoir can be made, which will hold almost any quantity of water; that it is of such a nature that the construction must be done all at the same time; that they cannot go there and build part of these dams with any economy and at some later date get all the equipment and everything back to go on with the dam; (2179) that he might have said that the Commission might be criticised for the size of the construction were it not for the fact that it was the Commission's intention to take other waters of other rivers tributary to the Connecticut River, but that he does not remember saying that those structures were designed to be built to take care of more water than was immediately necessary; that this very small increment of water from the Ware and Swift Rivers that must be diverted will be so small that there is no method of measurement that has ever been devised that will show a difference in the channel of the Connecticut River before and after that diversion; (2180) that as to the dissolved oxygen, it is just the same thing; that

by 1970 there is no reason why other people should not go to the Swift Reservoir and get their water; that sometime or other Hartford or some city will put a pipe line up to the Swift River and have some of that water; that by 1970 the four States interested in the River—Vermont, New Hampshire, Massachusetts and Connecticut will sit around a table and consider this; (2181) that taking water from other tributaries of the Connecticut River after the Ware and Swift were taken was considered but that the witness did not say that he contemplated it; that the other water which could be gotten into the Swift would be the Millers, Deerfield, Westfield and the Quaboag, all of which are tributaries of the Connecticut; that these are ones which must be the next stop in the development of the Ware and Swift; that the Swift River could be made large enough to take care of the Metropolitan District and also the City of Hartford, if waters were diverted from the above four tributaries; (2182) that he thinks the Metropolitan District could feed other places if needed; that it is the best reservoir site that he has ever seen but that he has seen better dam sites; that the construction of the dam is perfectly practical and will have a perfectly satisfactory result.

THE LAWRENCE WATER SUPPLY AND QUOTATIONS FROM MORRIS KNOWLES' REPORT TO THE LAWRENCE WATER COMMISSION, 1917

It was agreed that quotations from the above report could be read into the record and they were so read in. They are found on pages 1511 to 1527, inclusive, of the transcript of evidence. Certain portions of this report are inserted in this joint abstract, as follows—

> (1511) "As a source of water supply the Merrimac is grossly polluted now, and will probably continue to become more polluted as time passes. Under present conditions its purification is incomplete and is attended

by certain lapses, which at numerous times in the past have reached a disquieting if not a dangerous stage. Although this supply can be artificially treated and purified so as to be perfectly safe to drink, the weight of disfavor against the stream as a source of supply has become so great and so real as to actually obliterate any economy in its use.

We therefore recommend that the Merrimac River be abandoned as a source of water supply for Lawrence."

Page 7. (1512) "In the same year (1887) the Merrimac River was declared an open sewer by the state legislature."

"Shortly after this there followed a most noteworthy series of typhoid fever epidemics on the Merrimac River."

"It was noticed and remarked that the outbreaks of the disease always followed those at Lowell, and with increased intensity."

Page 7.

"This phenomenon recurred in the late fall and winter months, year after year, with unusually severe epidemics in 1881 and from 1887 to 1891. Literally hundreds of Lawrence people died from the disease during these years" . . . . "The more intelligent citizens generally boiled the water for drinking purposes, or used various spring waters" . . . . "but the situation gradually grew from bad to worse." (1513) "Attempts in 1904 to purchase water from neighboring towns were without avail, and it appeared that reversion to the deadly raw river water was imminent."

In summing up the history and development of the water supply of Lawrence, Mr. Knowles makes note of several salient features. He states as follows:

"Salient Features: To the unprejudiced observer, three facts stand out strikingly, if somewhat paradoxically, in a study of the history of Lawrence's water supply.

FIRST: The consignment of the Merrimac River to the status of an open sewer, by the State Legislature of 1878. The importance of this Act, lies not only in its direct consequences, but in the index it gives to public opinion concerning the quantity of the water,—in short—to the reputation of the stream and wisdom of using it as a source of supply.

SECOND: The tremendous good achieved in Lawrence by the introduction of the processes of filtration, as a safe-guard against the infected waters of the Merrimac River.

THIRD: The long-standing and increasing antipathy of the public against continued use of the existing source of supply, regardless of filtration—efficacious or otherwise.

Page 4 (1515)

"The volume of sewage poured into the river is enormous, and it is computed that at average river stages there is one gallon of sewage in every 52 gallons of water flowing past the City of Lawrence." Page 5.

"Diagram C, being the result of a chemical and bacteriological survey of the river from Lawrence to the State line, shows the effects of this pollution in a graphical way. The unmistakable marks of heavy sewage pollution are shown throughout its course, as one would expect, but the diagram shows in addition the remarkable recovery from the added pollution at Lowell, between that city and Lawrence. To be sure, the river is somewhat more polluted at Lawrence than at a point just above Lowell, but the measurements show that the difference is not as great as one might expect. Incidentally the diagram shows in a striking way the beneficial effect of settling in the large reservoir created by the Essex Company's dam. The surveys were made during times of low to average discharge in the river, so that stream velocities were sufficiently low to permit the action of sedimentation and time to become manifest.

During the dry period it requires about 2½ days for the sewage of Lowell to reach Lawrence; during aver-

age flows it requires from 30 to 36 hours, and during flood flows it requires *only 2 hours for Lowell sewage to reach the intake of the water street pumping station.*

From the angle of our present problem, namely Lawrence's water supply, the lessons to be (1517) drawn from the data of Diagram D are more or less obvious. From it we see that ever increasing loads are being thrown upon the water purification works at Lawrence, which in turn must demand an increasingly effective purification if the quality of the supply is to be maintained at a safe standard. That a part of this purification may be accomplished by treatment of the tributary sewage does not invalidate this conclusion.

(1520) Aesthetic considerations which have to do with the reputation of the water supply, are important to all of us, particularly to the more intelligent. One likes to feel that his drinking water supply is beyond reproach in addition to its satisfactory appearance and apparent harmlessness. The attitude is traditional, being grounded in the early history of civilization. During its evolution, society has had to learn through costly and often fatal experience that unclean drinking water is a dangerous thing, although the causes for this fact remained a mystery until the last part of the last century. And, although modern science has been able to rid polluted water of its curse, by removing its infection, and making it safe through filtration, as yet it has not been able entirely to destroy the repugnance toward the drinking of a water *known* to be from an unclean source.

In the foregoing chapters, we have remarked some of the manifestations of the antipathy of Lawrence people toward their water supply. We have seen that, contrary to experiences with filtered supplies elsewhere, this antipathy has grown rather than diminished. It seems to follow, therefore, that the unpopularity of Lawrence's water supply has to do with something more subtle than slight physical disqualifications; otherwise custom and usage would have overcome the objection."

(At this point Mr. Knowles gives several illustrations of public opinion concerning the matter of taking water from the

Merrimac River. He devotes four pages to quotations from various newspapers in support of his contention that the people of Lawrence do not want water from the Merrimac River under any conditions even though it be filtered. A typical example of this is the quotation from the "Eagle" of August 11, 1905, which says:—)

(1521) "There would seem to be no need of haste in constructing a new filter. The people of this city do not want Merrimac River water for drinking purposes even though it be filtered, and the effort to secure some other means of water supply should not be abandoned just yet."

"At present, however, the pollution of the Merrimac River itself undoubtedly is the strongest element affecting public opinion. Since direct ill effects from the use of this water are not known to exist, it follows that antipathy to the Merrimac is largely an aesthetic matter, or one having to do with the appearance, taste and odors of the filtered Merrimac supply. Plates 11 and 111 giving views of the Merrimac River a short distance above Lawrence, illustrate the thing which is undoubtedly at the bottom of the public mind in its conception of the Merrimac supply."
(1521)

"The various pollutions and *nuisances* shown in these photographs are comparatively unimportant in proportion to the vast quantity of sewage discharged into the river at Lowell only a short distance above. These particular instances may be even unknown to a large percentage of the people in Lawrence; yet nevertheless they characterize the thing that is repulsive to the Lawrence water consumers, whenever they think of the matter at all, have some such picture of the source of their (1522) water supply before the mind. Science may characterize such objection as absurd, and modern sanitary practice may and can offer means of overcoming much of the physical and chemical nature of the *pollution* but it nevertheless remains that these objections are entirely human, and not readily to be gainsaid. Moreover, it is generally recognized among sanitary scientists and engineers that "Innocence is better than repentance", applies as well to a water supply as it does to a course of conduct."

"A Measure of Dissatisfaction.

The value of an enterprise can often be estimated from the success of its competitors, and remarkably enough, perhaps, such a criterion of worth is at hand, ready to be applied to the Lawrence water supply. We refer to the "spring" water business in Lawrence.

There are very few private wells or springs in use in the city of Lawrence. Besides the municipal supply, however, Lawrence has still another source of water supply in the various bottled spring and well waters which are sold throughout the city. These waters come from sources which lie largely outside the city limits, and are peddled from house to house by some 15 different dealers at prices ranging from 3 to 5c. per gallon, or at an average price of 3.9c. per gallon. The enterprise is of large proportions, so large in fact that it may be considered an important rival to the municipal supply. The total amount of spring water business in 1917 in Lawrence amounted to only a little less than $70,000.00 or 55 per cent of the average annual revenue from all water consumers, of the Water Department itself.

That this state of affairs is entirely abnormal is shown by Diagram M. wherein the consumption of spring waters per 100,000 population in Lawrence is graphically compared with that in a number of other cities. The diagram will show at a glance that the use of spring water per capita in Lawrence is many times that in any of the other five representative cities. There must be some reason for this striking contrast, and we believe the reason to lie more or less self-evidently in the dissatisfaction of the public with the municipal water supply.

It must be a genuine complaint that will cause consumers to pay about 300 times as much per gallon for the spring water as they would have paid for drinking water which might be drawn from any municipal tap. —and this is the ratio of costs in Lawrence.

Those who object to drinking Merrimac River water find a ready, though somewhat expensive recourse, in the bottled spring waters, and the extent to which such waters replace the municipal supply (1523) for drinking

purposes is a direct measure of the number of objectors to the latter, and hence of the unpopularity of that supply. The conception is by no means a novel one; the same condition has been found to govern in other communities where there are those who take exception to the quality of the public water supply.

The cost of the unpopularity of Merrimac water in Lawrence may therefore be estimated by the expense of spring water which is used as an alternative by the objectors, or by the expense of that amount of bottled water which is in *excess* of the normal. Normally, the sale of bottled spring waters in any of our large cities is limited almost entirely to office buildings where the principal consideration is the convenience of the container itself, this being readily handled and iced.

(1524) "What profits it to develop a public water supply at large cost, so that it is free from infection and so that it is even of good appearance, if the public —or a considerable part of it,—refuse to drink that water? Whatever reasons the public may have for this attitude are irrelevant to the conclusion so long as those reasons cannot be overcome.

Moreover, after all it is the people who are paying for their water supply, and surely from a business standpoint there can be no good reason against giving them the thing they want, if they can afford its cost.

Accordingly, we must consider further use of the Merrimac River for a source of supply as a thing to be avoided if at all practicable, or at all compatible with the interest of economy."
(1526)

"In chapters V and VI we have seen that only a minor improvement in the raw river water may be gained by taking it at a point immediately above Lowell, rather than at Lawrence, and, in general, that slight, if any, improvement in the final effluent from the works of Project 3 may be expected in comparison with Project 1. These remarks apply with equal force to the Concord River project, and accordingly we conclude that both should be rejected:

"*Disadvantages*: No matter how well safeguarded, the project would be subject (at least to some extent) to the menace as well as to the sentimental stigma, of a heavily and dangerously polluted source of water supply,—that would not only be ever present but would continually increase with the increasing pollution attending the growth of population on the watershed. On account of the high organic content of the raw water, odors and tastes characterized as "very faint", would give rise to occasional complaints, both real and imaginary, affecting the value of the water supply to its detriment."

(1527) "Although color of the purified and treated waters would conform to our standard of not over three parts per million, it would nevertheless be sufficiently high to cause occasional complaint. We would expect that the most serious disadvantage would arise simply from the "sentimental" objection to using water from a highly polluted source, and one which would hold in the the minds of laymen, regardless of the effectiveness of the purification process."

Page 21. "We find that the loss to the community which is directly chargeable to sentiment against using water from the Merrimac River, would amount to about $16.00 *per million gallons of water supplied to the city.*"

In addition to the above excerpts, the complainant introduced other excerpts from that report; these excerpts are contained in Ex. C-40 which is herein set forth:

In commenting upon the excerpts contained in that exhibit, Mr. Jacobs said,

"The only thing which these excerpts show is that one of the advantages of the site finally recommended was that the Merrimac River could be pumped and stored in this recommended reservoir on Bartlett's Brook, storage of Merrimac River water for purification is also indicated in the consideration of the Fish Brook project. But as stated under that project the storage of Merrimac River water is not finally rec-

ommended, and one of the reasons for it was that the drainage area of the storage reservoir which we finally located on Bartlett's Brook had sufficient drainage area so that it was not necessary to start pumping, although it was taken into consideration. Some of the other excerpts merely show the prejudices and the inefficiency which existed in Lawrence, all of which I feel has been corrected by the project as outlined for a much larger District than the small city of Lawrence. I believe it has been testified by Mr. Dooley that in spite of the fact that this report was made 13 years ago and other reports have been made since, Lawrence still takes its water out of the Merrimac, and the filtration plant has been improved."

Chapter I— Pages 14 and 15

"* * * * In the same year Mr. D. J. O'Mahoney, manager of the filter, demonstrated that if not hampered by political interference, about one-third of the total cost of filter operation and maintenance could be saved each year,—an interesting commentary on working conditions and by no means an unimportant matter. Unfortunately, the demonstration has not borne much fruit.

Continued Dissatisfaction:—On account of increasing difficulties in filtering enough water to supply the city, particularly during the winter months, the pleas of the filter management for additional capacity became yearly more insistent. Their recommendations were for covering and rebuilding the old filter. * * * *"

Chapter II—Page 33

"* * * * Years ago it was demonstrated by a careful study and many experiments that one of the Lawrence filter beds could be scraped most economically by a gang of about ten men. Such a gang of men represents the usual maintenance force always at the plant. All too often however, the scraping gang has had to be increased to double and sometimes treble the most economical force, on account of the desire for work—lack of work for city laborers elsewhere, and sometimes,—unfortunate to relate,—to a desire to find places for

men to work. The result of course has been uneconomical filter scraping and expensive operation costs, because much time and energy is lost through the men getting in each other's way. * * * *"

Chapter II—Pages 41 and 42

"* * * * We have attempted, in the foregoing to discover some of the causes for the excessive cost of filtration at Lawrence. To recapitulate them they are briefly:

(1) Lack of modern type of construction and proper equipment.

(2) Clogged filtering material, which adds greatly to the troubles, increases the cost and reduces the output of the filtration process.

(3) Certain incorrect and doubtless inefficient methods of operation, which are now and always have been in existence at the Lawrence filters.

(4) The hampering and expensive influence of an over-manned force.

All of these difficulties may be remedied and we are at liberty to conclude therefore, with properly constructed and equipped filters, the introduction of improved methods in operation and by divorcing filter operation from politics, that costs of filtration not more than half as great as those which now prevail are readily possible at Lawrence. * * * *"

Chapter VI—Pages 8, 9 and 12—Referring to the Fish Brook project, Mr. Knowles said:—

"* * * * *Description of Proposed Works:*—This, essentially, is a purification project in which the preliminary treatment is accomplished by storage and dilution.

*****

Since this supply is insufficient for Lawrence even at the present time, the deficiency is to be made up by pumping water from the Merrimac River to the reservoir, where a dry weather storage of about 160 days would be obtained. We could confidently expect that this would effect a considerable improvement in the character of the raw Merrimac River water, both because

of dilution and because of the effect of storage. Color would be reduced to about 40 percent of that in the raw river water, while practically all turbidity and most of the suspended matter should be removed. We may expect a bacterial reduction of not less than 85 per cent, if figures are based upon bacterial counts of the raw river water.

****

Alternative Site: Fish Brook offers one of the two available sites for accomplishing the preliminary treatment of the Merrimac River water by storage. The other site is at Bartlett Brook on the opposite side of the river, and lying about two miles due north of the proposed Fish Brook Reservoir. This project will be considered later, in Chapter 7, as an independent source of water supply; since the available watershed at this site is large enough so that recourse to the Merrimac River for an auxiliary supply is not necessary, within the period of our comparative design. * * * *"

****

Chapter XI—Page 9

Referring to the Bartlett's Brook project as finally recommended for Lawrence, Mr. Knowles said:—"It may be worth while to point out that one of the advantages of this project,—albeit a doubtful one from the standpoint of quality,—is that in case of emergency, Merrimac River water could be pumped into the reservoir, to be stored for a long time, to supplement the supply. * * * *"

QUALIFICATIONS OF EXPERTS

NATHAN B. JACOBS, an expert witness for Connecticut, (218) is a Civil Engineer residing in Pittsburgh, Pennsylvania. He is Vice-President and executive in charge of the organization of Morris Knowles Incorporated. He was graduated from the University of Pittsburgh in 1914, receiving the degree of Bachelor of Science from the Department of Sanitary and Hydraulic Engineering. In 1917, he received the degree of Sanitary Engineer from the University of Pittsburgh. Shortly after graduation in 1914, he became associated with Mr. Morris Knowles, and his professional work since that date has been in association with Mr. Knowles. Prior to that, he had experience in municipal engineering and sanitation, including work in connection with the construction of the filtration plant in Pittsburgh. In 1920, (219) he was associated with Mr. Knowles and Mr. Frank W. Main of Pittsburgh in the formation of the Knowles-Main Appraisal Bureau. He was associated with Mr. Knowles in 1918 in the organization and operation of Morris Knowles Limited, a Canadian corporation organized for handling work in the Dominion of Canada.

From 1914 to 1917, he was engaged in water supply and sewerage engineering, in investigations involving sanitation and in studies on the occurrence of typhoid fever. He did investigation, design and supervision of construction work on water supplies and sewerage works in many municipalities in Pennsylvania and Eastern United States. During that time, his work included valuations, appraisals and financing of publicly and privately owned utility properties. In 1917, when Mr. Knowles went to Camp Meade as Supervising Engineer representing Morris Knowles Incorporated, and Mr. Maurice R. Scharff, Mr. Knowles' principal assistant, went to Camp McClellan, Mr. Jacobs had charge of the general office of Morris Knowles Incorporated in Pittsburgh and had much of the responsibility, under Mr. Knowles' direction, of the work of the office, involving water supplies, sewerage and utility improvements of many municipalities and public service companies.

Since 1921, (220) he has been principal assistant to Mr. Knowles and has had responsible charge of Mr. Knowles' organization. The work of the organization has included water supply, sewerage investigations, city planning studies, hydraulic studies, considerable appraisal and valuation work, and the operation of a laboratory which was started in 1917 and which does a great deal of bacteriological and chemical analysis of water. Among the larger municipalities, he has served private corporations in Williamsport, York, Sunbury and Pittsburgh, Pennsylvania. He has acted for the last five or six years as manager of the Lewistown-Reedsville Water Company, a privately owned corporation supplying a small metropolitan district comprising several boroughs and towns in Central Pennsylvania. He has been in charge of a sanitary investigation of the Alleghany River, one of the principal tributaries of the Ohio River, dealing principally with the industrial waste conditions in the river. He had charge of much of the investigation for the mine pollution case often referred to as the "Indian Creek Case," involving pollution by mine wastes of the water supply of the Pennsylvania Railroad. During the period that the Engineering Board of Review of the Sanitary District of Chicago was in session, he was principal assistant for the committee on the construction program. Mr. Knowles (221), was Chairman and there were associated with him on the Committee some of the most eminent engineers in the country. His work was preparing sketches and studies for the development and construction of the sewage purification and intercepting system involving expenditures estimated at that time at about $125,000,000. He has made hydraulic studies for the Pittsburgh Flood Commission on the effect of storage dams on flood conditions in the Ohio River basin. In valuation and appraisal work, he has been associated with a number of the larger projects involving water utilities, such as the supply of the cities of Scranton and Wilkes-Barre, and with numerous others involving not only the valuation of the structures, but in many cases, the valuation of water power rights and water power developments. He made an appraisal of the entire works

and property of the Alabama Power Company, a $38,000,000 corporation, owning numerous dams and water power rights both developed and undeveloped, throughout Central and Northern Alabama and Tennessee. He has always considered himself, (222) as working under Mr. Knowles' direction, with the exception of a few months when Mr. Knowles was very seriously ill. By the end of the war, the Pittsburgh office of Morris Knoles Incorporated employed about two hundred men. During the war, he conducted some of the investigations on water supply for the Housing Division of the United States Shipping Board.

MAJOR EZRA B. WHITMAN, an expert witness for Connecticut, (334) is a Consulting Engineer residing in Baltimore, Maryland. He was educated in the private and public schools in Baltimore, attended the Baltimore City College, and was graduated at Cornell University with the degree of Civil Engineer in 1901. In 1904, he took a special course in chemistry and bacteriology in the Cornell Medical School. After graduation from Cornell, in 1901 and 1902 he was employed by the Bacterial Sewage Purification Company of New York, and while with that company had charge of the design and construction of about twelve small sewage disposal plants for large country estates and institutions. In 1902, he went to Chicago with the Cameron Septic Tank Company of that city and had charge of the design and construction of three institutional plants for the State of Iowa and one for the State of Missouri. In 1902, he became a member of the firm of Williams and Whitman, Sanitary Engineers, in New York City. As a member of that firm, (335) he designed sewerage systems for Havre de Grace, Maryland; Tacoma Park, Maryland; Sayre, Pennsylvania; Spring Grove, Pennsylvania; Leetonia, Ohio; Revena, Ohio and Newton, New Jersey. He designed sewage disposal plants for Tacoma Park, Maryland; Waverly, New York; Ithaca, New York; Leetonia, Ohio; Ravena, Ohio; Marion, Massachusetts, and Newton, New Jersey, the National Home for Disabled

Volunteer Soldiers at Johnston City, Tennessee, and the State Hospital for Tuberculosis at Raybrook, New York.

In 1906, he was appointed Division Engineer of the Baltimore Sewerage Commission, which had charge of the design and construction of practically a complete storm water and sanitary sewer system for the City of Baltimore. His position was that of Division Engineer in charge of sewage disposal. In this position he took charge of the Sewage Testing Station, carried on experiments with regard to various features of construction, and as a result of that experimental work, determined certain features of design for the Baltimore sewage disposal plant. He had complete charge of the design and construction of the main sewage disposal works for that City, and also of sewage disposal plants in several of the outlying districts which could not be brought into the main sewer system.

From 1914 to 1916, (336) he was a member of the firm of Greiner and Whitman, Consulting Engineers of Baltimore, from 1916 to 1925, a member of the firm of Norton, Bird and Whitman, and from 1925 to date, a member of the firm of Whitman, Requardt and Smith. He has designed sewer systems for Towson, Arlington and Govans, Maryland, which are suburban sections just outside of Baltimore, for Little Falls Brook drainage area adjoining Washington, (337) for Rockville, Maryland; Christield, Maryland; Macon, Georgia; Winchester, Virginia; Aberdeen, Maryland; Dundalk, Maryland; Wawasett Park, Delaware; for the DuPont Company at Conagona in the Province of Quebec, Canada; for Overlea, Maryland; and Fort Thomas, Kentucky. He had charge of the actual construction of sewers in a number of these places and of the sewage disposal plants in Macon, Aberdeen and Dundalk. He made a valuation of sewerage systems and sewage disposal plants for the Mount Washington Sewerage Company, for the Development Aid Corporation and for Elizabeth City, North Carolina. He designed sewage disposal plants for Newark, Delaware and Fort Thomas, Kentucky, and Dundalk,

Maryland. In 1911, after leaving the Sewerage Commission in Baltimore, he was appointed Chief Engineer and President of the Water Board of Baltimore City. He had complete charge of the maintenance and operation of the entire water plant for the City of Baltimore while occupying that position, and also had complete charge of the design and construction of a number of improvements to the existing system, including the building of a new dam. He designed, (339) a pumping station of 160 million gallons per day capacity, a filtration plant of 126 million gallons per day capacity, and several other pumping station improvements. He resigned as Chief Engineer of the Water Department in 1914, but he was retained by the City of Baltimore as Consulting Engineer to take charge of the improvements started under his term as Water Engineer for the city. He has made reports on the water supply for Bristol, Virginia, and designed and constructed water systems for Dundalk, Maryland and Wawasset Park, Delaware. He made a report on a new water supply and designed and had charge of construction of water supply improvements for Winchester, Virginia; Ellicott City, Maryland; Sudbrook Park, Maryland; Martinsburg, West Virginia; Conacona, Province of Quebec; and Frostburg, Maryland. He was Consulting Engineer to the City of Covington, Kentucky, on the subject of water supply improvements following a typhoid epidemic. He is (341) engineer for the City of Albany on the new water supply for that city. He was on the Public Service Commission of the State of Maryland for 6½ years and occupied the position of Chairman of that Commission during 1924. For the past eight years he has been a Trustee of Cornell University. He is at present engaged in a valuation case before the Public Service Commission in Maryland of fifteen electric properties in the State. During the war, (342) he was in the Construction Division of the Army, which had charge of all the construction that was done in this country. He was commissioned Major. While he was a member of the Public Service Commission in Maryland, (363) there was tried before the Commission the Conowingo Case, involving the question of the

economic feasibility of the Conowingo Power Project. He has made (364) valuations of water power at the Union Bridge Milling Company and of three water powers on the Gunpowder River. He built a hydro-electric plant in connection with the Baltimore sewage disposal work—a plant of about 225 horse power. He made a study (367) for the Union Gas and Electric Company of Cincinnati and the Columbia Power Company to determine the price to be paid for power generated at the Columbia Power Company's 100,000 K. W. station on the Ohio River, supplying Cincinnati and vicinity. The Consolidated Gas, Electric Light and Power Company (368) employed him to review its contract with the Pennsylvania Water and Power Company for purchase of hydro-electric current. He was a member of the Engineering Board of Review of the Sanitary District of Chicago and served on two committees, one of which (369) was the Committee on Water Supply and the other the Committee on Water Power. While engaged in that work, he examined all of the water power plants in the neighborhood of Niagara, both on the Canadian and American sides. As a member of the Committee, he made a comparison of the relative value of water power in the valley of Niagara and in the valley of the St. Lawrence, as compared to water power along the Illinois River. He has made a study of the possibilities of power development along the Canadaigua outlet of Lake Cayuga. He has made a study of the possibilities and cost of developing power (370) from Lamoka Lake to Kenka Lake. He has had a number of occasions to investigate the cost of operating hydro-electric plants.

DR. WILLEM RUDOLFS, an expert witness for Connecticut (414) is Professor of Water Supply and Sewage Disposal at Rutgers University, New Jersey, and lives in Dayton, New Jersey. He is also Chief of the Department of Water Supply and Sewage Disposal of the New Jersey Agricultural Experiment Station and is in charge of the water and sewage

plants for all State institutions in New Jersey. He does consulting work, having been employed as consultant by the Port Raritan District Commission of New Jersey to investigate the stream conditions of the Raritan River. He was born in Holland and attended the University there for about six years. He was trained as a chemist, botanist and bacteriologist. He came to the United States (415) in 1916 and went to the University of Illinois for about 2½ years where he was employed as a chemist and did part-time study. From there, he went to Rutgers University and was appointed Research Fellow, making studies in chemistry and bacteriology. Following this he was appointed Research Fellow by the Pasteur Institute at Paris, France. On his return to the United States, he was appointed Chemist Research Fellow at Rutgers University for one year and was then appointed biochemist. Following that (416) he was appointed to his present position as Chief of the Department of Water Supply and Sewage Disposal, and later, to be Professor. The Department of Water Supply and Sewage Disposal is a research agency, working under a State statute for investigation of the biology of sewage disposal and makes many reports and publications on results of its work. More than seventy publications and technical articles have been written, besides some fifty others which do not deal directly with water treatment and sewage disposal. He is retained by the State of New Jersey in the suit between New Jersey and the State of New York before the United States Supreme Court and has been in charge of the investigations dealing with stream pollution in connection with that case. He has been retained by the International Coal Combustion Company in a stream pollution case before the Chancery Court in New Jersey. For a number of years, he has been consultant for the City of Milwaukee on their sewage disposal problems. A year ago he was appointed by the Public Health Section of the League of Nations to make an investigation in Germany, Holland and England of stream pollution, (417) and water and sewage conditions, for the purposes of an extensive report.

PROFESSOR C.-E. A. WINSLOW, an expert witness for Connecticut, (501) is Professor of Public Health at Yale School of Medicine, and resides at 314 Prospect Street, New Haven, Connecticut. He graduated with the degree of Bachelor of Science from the Massachusetts Institute of Technology in 1898, and took his Master's degree in 1899. Since that time, he has been continuously engaged in teaching and research in the field of public health at the Institute of Technology, the University of Chicago, the College of the City of New York, and since 1915, at Yale University. He has served also (502) at various times as a member of the staff of the Massachusetts State Board of Health and the New York State Department of Health. For the past 12 years, he has been a member of the Public Health Council of the State of Connecticut. Since 1918, he has been a member of the Health Committee of the League of Nations at Geneva and a member of the Board of Scientific Directors of the International Health Division of the Rockefeller Foundation. From 1903 to 1910, he was in charge of the Sanitary Research Laboratory and Sewage Experiment Station of the Massachusetts Institute of Technology, which was then conducting extensive investigations on sewage treatment. Later, he was the Chairman of the special committee in charge of the preliminary experiments on the treatment of sewage at New Haven. He is joint author, with the late Professor Kinnicutt of Worcester and Mr. R. W. Pratt, of the textbook "Sewage Disposal," and in collaboration with Professor S. C. Prescott of the textbook "Elements of Water Bacteriology," as well as of various other books on public health and of articles in the technical press. He was connected, as an expert advisor, with the investigations leading to the construction of the Charles River Dam. He testified in the Jersey City Water Case in 1907 and 1911, the Chicago Water Pollution Case in 1910, the Auburn Water Case in 1912, 1913 and 1914, and as an expert (503) for the United States Bureau of Chemistry in various water and food cases. As a member of the Industrial Wastes Board of Connecticut, he was responsible for various studies of stream pollution.

JOHN H. GREGORY, an expert witness for Connecticut. Residence: Baltimore, Maryland.

Business: Consulting Engineer. Also Professor of Civil and Sanitary Engineering in the John Hopkins University—head of the Civil Engineering Department in the School of Engineering, and head of the Sanitary Engineering Department in the School of Hygiene and Public Health.

Education: Graduate of Massachusetts Institute of Technology, Boston, Massachusetts—Class of 1895—in Civil Engineering.

For the last thirty-four years, actively engaged in the design and construction of water supply and water purification works, including dams, reservoirs, pipe lines, slow sand filtration plants, rapid sand filtration plants, and pumping stations. Also similar work in sewerage and sewage disposal, such as sewers, storm water drains, sewage pumping stations and sewage disposal works. Also valuation, mainly of water works properties.

In the summer of 1893, Office Assistant in the Metropoliton Sewerage Works at Boston and on surveys and designs of sewerage works.

In the summer of 1894, again with the Metropolitan Sewerage Works of Boston as draftsman and transitman on the construction of the outfall sewer at Deer Island, Boston Harbor.

From 1895 to 1897 in Boston as an Office Assistant in the Metropolitan Water Works, engaged largely on studies and designs for the Wachusett Aqueduct and Wachusett Dam, two low dams and large distribution mains.

From 1897 to 1900 in Albany, N. Y. as Assistant Engineer and Resident Engineer on the water filtration plant, covering the design and construction of a 15 m.g.d. filtration plant, pumping station and steel pipe line.

From 1900 to 1902 in Philadelphia, Pa. as Assistant Engineer in charge of designs on the improvement, extension and filtration of the water supply. These designs covered the first four filtration plants built by the City of Philadelphia, having capacities respectively of 6½, 15, 33, and 100 m.g.d. At the time the Torresdale filter plant, having a capacity of 100 m.g.d., was put under construction, it was the largest single filter plant in the world. The designs also included an uncovered raw water reservoir and an uncovered filtered water reservoir, also four covered filtered water reservoirs. Designs further covered two pumping stations, one of which had a total capacity of 120 m.g.d. Also, contract drawings for large distribution mains in the City proper.

From 1900 to 1902—Division Engineer on the Jersey City Water Supply Company, Jersey City, N. J. This was a water supply works having a capacity of 50 m.g.d., a masonry dam, a storage reservoir, and a water conduit 26 miles long. Was in charge of the construction of the conduit, numerous detail drawings for the dam and conduit, and also a small amount of engineering work at the filtration plant and pumping station of the East Jersey Water Company at Little Falls, N. J.

From 1903 to 1904—In New York City as Principal Assistant Engineer in the Filtration Department of the Commission on Additional Water Supply, which was engaged in studying the additional sources of supply for New York City. The work covered investigations, studies, designs and estimates of cost of a proposed 500 m.g.d. water filtration plant and also investigations and studies of works for filtering the existing Croton water supply in New York City.

From 1904 to 1909 in Columbus, Ohio, as Engineer in charge of design and construction of water and sewerage works. The water works consisted of masonry dam 30 feet high, 1,000 feet long; a storage reservoir having a capacity of 2,000,000,000 gallons, six miles long; a rapid sand water filtration plant having a capacity of 30 m.g.d.; and a new pumping station having

a capacity of 40 m.g.d., together with large distribution pipe lines. The sewerage works consisted of a sewage disposal works 20 m.g.d. capacity, two sewage pumping stations, sewers and sewage force mains, and other miscellaneous work. Also the design of a sewage testing station, which was operated for a period of one year, to determine the best method of treating the sewage of the City.

From 1909 to 1910—Resident Engineer on the Passaic Valley sewerage project in the Passaic Valley, N. J., covering surveys and plans for the Passaic Valley sewer which was later built from Great Falls, Paterson to Newark Bay, and collecting the sewage from twenty cities and towns in the Passaic Valley, the largest cities being Newark, N. J. and Paterson, N. J.

From 1910 to 1911 in New York City as Engineer with the Metropolitan Sewerage Commission, engaged on investigations and studies of sewers and works for collecting and disposing of the sewage of New York City.

From 1901 to 1911 also engaged on miscellaneous water filtration work in connection with filtration works built at Milford and Springfield, Mass.; Jamaica, Long Island, N. Y.; Youngstown, Ohio; New Haven, Conn.; New Milford, N. J.; and Montreal, Quebec, Canada.

From 1911 to 1917 in New York City as a member of the firm of Rudolph Hering and John H. Gregory, Consulting Engineers, largely in connection with water supply and sewerage works.

From 1917 to 1919 in New York City in private practice, as consulting engineer on similar work.

From 1919 to date in Baltimore, Maryland in private practice as consulting engineer and also connected with the Johns Hopkins University.

From 1911 to date, connected with many water supply and water purification, sewerage and sewage disposal works and valuation, some of the more important of which are as follows:

Albany, N. Y.—Sewage disposal investigation and report and contract plans and specifications for sewage disposal works, which has a capacity of 30 m.g.d. Also sewage pumping station which has a capacity of 60 m.g.d.

Atlanta, Ga.—Consulting Engineer on sewage disposal works during construction.

Austin, Tex.—Sewage disposal investigation and report, plans for sewage disposal works and sewage pumping station, and served as Consulting Engineer during construction.

Baltimore, Md.—Investigation and report on the adequacy of design and construction of a filtered water reservoir then under construction; investigation and report on deferring construction of a new pumping station; and investigation and report on character of construction of additions to the existing rapid sand filtration plant.

In 1928, made a report to Baltimore on the next future water supply, recommending a new source of supply, with filtration, and locating it entirely independent of the existing source of supply. Also valuations of seven private water companies which were acquired by the City. Capacity of new source of supply recommended—80 m.g.d.

For the Sanitary District of Chicago—Was a member of the Engineering Board of Review having to do with the Lake Level Controversy and the disposal of the sewage of the Sanitary District. Was a member of the Sewage Disposal Committee and later appeared as a witness in the re-reference before Mr. Hughes, on questions relative to sewage disposal.

Charleston, S. C.—Investigation and report on water sup-

ply and made the valuation for the City of Charleston Light and Water Company, which property was later acquired.

In 1919 made a report to the City of Columbus, Ohio on additional water supply works and for five years served as Consulting Engineer on the construction of these works, which consisted of a dam 64 feet high and 1,750 feet long; a storage reservoir, capacity 5,300,000,000 gallons, 8 miles long; enlargement of the filtration plant from 30 to 54 m.g.d., together with large water distribution mains.

In 1925 was one of a Committee of three engineers retained by the City of Detroit, Mich. to investigate and report on sewage disposal. The approximate estimated cost of works recommended was $39,000,000, and since that date a part of the work has been built.

Fort Worth, Tex.—Plans and specifications for enlargement of the existing water filtration plant and Consulting Engineer during construction. Also recommended the Lake Worth conduit, mainly a 60-inch reinforced concrete pipe some 5½ miles long; recently built.

During the construction of the Montreal, Quebec water filtration plant, capacity 60 m.g.d., served as Consulting Engineer representing Mr. Hering.

For New York City, N. Y., was one of a Commission of five engineers reporting to the Board of Estimate and Apportionment on filtration of the Croton water supply.

For Trenton, N. J., several investigations and reports on sewage disposal and preparation of detail plans and specifications for sewage disposal works and sewage pumping station.

For the last eight years, and at present, Consulting Engineer to the Sewer Department of Baltimore, Md., relative to the construction of the larger new main sewers, as well as on the

enlargement of the existing sewage disposal works. Also Consulting Engineer to the Public Improvement Commission of Baltimore on new water works improvements estimated to cost about $10,000,000 some of which work is now under construction, and other work being designed; and included in the same is a new storage reservoir having a capacity of about 23,000,000,000 gallons and a masonry dam about 133 feet high.

For the last three years, and at present Consulting Engineer for the City of Columbus, Ohio on sewers and sewage disposal works, the approximate cost of which will be upwards of $10,000,000, and a part of which is now under construction.

Has twice served the Maryland Public Service Commission of Maryland in connection with valuation of water works properties, and was engineering advisor to the City Solicitor of Baltimore and made the valuations of six water companies and one sewerage company, all of which properties have been acquired by the City of Baltimore. Also valuations of other water works properties elsewhere.

Member of the American Society of Civil Engineers, American Society for Municipal Improvements, American Society for Testing Materials, American Public Health Association, American Water Works Association, Boston Society of Civil Engineers, New England Water Works Association, and others.

Has written numerous papers and articles and discussions on water supply and water purification, sewerage and sewage disposal, hydraulics, etc., and have reviewed numerous books, for the engineering press, relative to the above subjects.

Has twice visited Europe and inspected the leading water supply and sewerage works in Belgium, England, France, Germany, Scotland and Switzerland.

DR. MONT FRANCIS MORGAN, an expert witness for Connecticut, Technical Training and Experience: B.S. (in Agr.) West Virginia University, 1920. One-half year graduate work there. Instructor in Soils, West Virginia University, 1920-1921. Master of Science degree, Ohio State University, 1922. Assistant Professor of Soils, Ohio State University, 1922-1923. Present position, Chief of Department of Soils, Connecticut Agricultural Experiment Station, since July, 1923. Also Associate Professor of Soils, Yale School of Forestry, Yale University, since 1928.

Technical publications:

(1) Factors Affecting Soil Reaction. I. The Soil Water Ratio. Jour. of Phys. Chem. 27: 117-140. 1923.

(2) Solubilities of Limestone as Related to Their Physical Properties. Soil Science 15: 293-305.

(3) Liming Materials. Timely Soil Topics, Ohio State University. 1923.

(4) Land Cover Studies as a Basis for a More Accurate Interpretation of the Soil Survey. Jour. of Am. Soc. of Agron. 16: 452-458.

(5) Practical Lawn Suggestions. Bul. of Immediate Information No. 48, Connecticut Agricultural Experiment Station.

(6) The Phosphorus Requirements of Old Tobacco Soils. Tobacco Station Bul. No. 7, Connecticut Agricultural Experiment Station.

(7) Should the New England Farmer Maintain Two Cropping Systems, One with Lime, the Other Without? Jour. Am. Soc. of Agron. 19: 683-684.

(8) Soil Acidity in Connecticut. Extension Bul. 101, Connecticut Agricultural College.

(9) Cropping Systems and Soil Efficiency. Extension Bul. 1 103, Connecticut Agricultural College.

(10) A New Field Method for pH Determinations. Ecology 8: 387-388.

(11) Soil acidity Methods as Applied to Soil Survey Work. Jour. Am. Soc. of Agron. 20: 881-892.

(12) Tobacco as an Indicator Plant in Studying Nutritional Deficiencies of Soils under Greenhouse Conditions. Jour. Am. Soc. of Agron. 21: 130-136.

(13) Soil Reaction and Liming as Factors in Tobacco Production in Connecticut. Bul. 306. Connecticut Agricultural Experiment Station.

(14) The Effect of Some Nitrogenous Fertilizers on Soil Reactions. Tobacco Station Bul. No. 10, p. 51-55, Connecticut Agricultural Experiment Station.

(15) Organic Matter in Tobacco Soils, Tobacco Station Bul. No. 10, p. 66-72. Connecticut Agricultural Experiment Station.

(16) A Study of Factors Affecting the Estimation of Lime Requirement from pH Values. Accepted for publication, but not yet published. Soil Science. 1930.

(17) A Spot-Plate Method for the Estimation of Nitrate Nitrogen in Soil and Other Extracts. Accepted for publication, but not yet published. Science. 1930.

DR. FRANK E. WINSOR, an expert witness for Massachusetts, Graduate of Scientific course, Brown University with degree of Bachelor of Philosophy, 1891; received degree of Civil Engineer 1892; Master of Arts 1896, and honorary degree of Doctor of Science in 1929. Was engaged on the construction of the Metropolitan Sewerage System, Boston, Mass., from 1891 to January, 1895; from January, 1895, to October, 1895, engaged on design of various sewer systems and was also Resident Engineer on construction of sewerage system for Natick, Mass., including pumping station, intermittent sand filters, etc.; October, 1895 to January, 1903, was engaged on the design and construction of the Metropolitan Water Works, including five years on the Wachusett Reservoir work and about two years on the construction of the Weston Aqueduct as Division Engineer. During the greater part of 1903 was engaged as Division Engineer upon investigations for an additional water supply for the City of New York; from November, 1903 to April, 1906 was engaged first as Designing Engineer upon investigations for an additional water supply for the City of New York; from November, 1903 to April, 1906, was engaged first as Designing Engineer and later as Principal Assistant Engineer on the design and construction of the Charles River Basin, Boston, Mass. From April, 1906 to August, 1915, was engaged on the Catskill Water Works system for New York City, being the first four years Senior Division Engineer of the Southern Aqueduct Department, and later Department Engineer in charge of the construction of the Hillview Reservoir, Kensico Reservoir and Dam, and about 32 miles of the Catskill Aqueduct, construction cost alone aggregating some $25,000,000. The 32 miles of aqueduct included some 13 miles of tunnel, 16 miles of large masonry aqueduct and 3 miles of steel pipe. From August, 1915, to September, 1926, Chief Engineer on the design and construction of a new water supply for Providence, Rhode Island, aggregating about $21,000,000, which supply included the Scituate Dam and Reservoir, the filtration plant of 50,000,000 gallons capacity, aqueduct, with tunnel three and a half miles long connecting pipe lines into

the distribution system, covered reservoirs, etc., From September, 1926, to date, Chief Engineer for the Metropolitan District Water Supply Commission, and until the summer of 1928 when the work on the new system of Providence was completed, acted also as Consulting Engineer upon that system.

Past president Providence Engineering Society, past president New England Water Works Association, president Boston Society of Civil Engineers, vice president American Society of Civil Engineers, member and past director Municipal Engineers of the City of New York, member American Water Works Association, Brown Engineering Association, etc.

ROBERT SPURR WESTON, an expert witness for Massachusetts.

Born—Concord, N. H., August 1, 1869.

Graduated Amherst College, 1891, B. S. A. M. 1894.

Assistant in industrial laboratories, 1891-1894.

Graduate student, Massachusetts Institute of Technology, 1894-1895.

First assistant chemist, Louisville Water Purification Experiments, 1895-1896.

Graduate student at the University of Berlin, Germany, 1897-1898.

Assistant on Water Purification Experiments for Louisville Water Co., Kentucky, Part of 1898.

Assistant to George W. Fuller, Professor Erastus G. Smith and others in connection with various water purification and

stream pollution studies, including those for the water works at York, Pennsylvania; Hornell, New York; and West Superior, Wisconsin. Also re-built water purification plant at Henderson, N. C. 1898-1899.

In addition to the above, served for short periods as Assistant for the Massachusetts State Board of Health, and a volunteer assistant in the laboratories of the Massachusetts State Board of Health (summer of 1894), and the Imperial Board of Health of Germany, (winter of 1898).

For 30 years, or since 1899, in private practice at 14 Beacon Street, Boston, Massachusetts; since 1916 under the firm name of Weston & Sampson, whose practice lies in the field of water supply, water purification, sewerage and sewage treatment, or what is sometimes called Public Health Engineering.

Among the important works are the following:

Water Purification Investigations at

Washington, D. C.
New Orleans, La.
Ansonia, Conn.
United Fruit Company, Cuba.
Salem-Beverly, Mass.
Biddeford and Saco Water Company, Maine.
Brookline, Mass.
Chester, Penna.
Cohasset, Mass.
E. Providence Water Company, R. I.
Exeter, N. H.
Hagerstown Water Company, Md.
Hartford Water Company, Vt.
Keene, N. H.
Knoxville Water Company, Tenn.
Oxford Paper Company, Maine.
Newport Water Works, R. I.

Pittsburgh, Pa.
Reading, Mass.
So. Orange, N. J.
(and other places).

Construction of Water Purification Plants

Amesbury, Mass.
United Fruit Company, Cuba.
Belfast, Maine.
Cohasset Water Company, Mass.
Exeter Water Works, N. H.
Gorton Pew Fisheries, Gloucester, Mass.
Hartford, Conn.
Hartford Water Company, Vt.
Keene, N. H.
Merrimack, N. H.
Middleboro, Mass.
Mt. Holyoke College, Mass.
Newmarket, N. H.
Oklahoma City, Okla.
Old Town, Maine.
Reading, Mass.
Sayles Finishing Plants, R. I.
Sayles-Biltmore Bleacheries, Asheville, N. C.
So. Orange, N. J.
Wakefield, Mass.
(and other places).

Reports on Water Supply—Studies of Stream Pollution

Study of Ten Mile River, Mass.-R. I.
Bayonne, N. J.
Berlin Water Company, N. H.
Billerica, Mass.
Charles River Basin
Dover, N. H.
Blackstone River, R. I.

Seekonk River, R. I.
Neponset River, Mass.
Squannacook River, Mass.
Assabet River, Mass.
Leamington, Ont.
Lebanon Water Company, N. H.
Litchfield Water Company, Conn.
Lynn, Mass.
Sudbury River (for Met. Dist. W. S. Comm.)
Oxford Paper Company, Maine.
Sanitary survey of water sources for Newark, N. J.
Newton, Mass.
North Jersey District Water Supply Commission

Consulting sanitary engineer from 1922 to date. Work includes special reports, supervision of sanitary engineering department and studies of waters in Northern New Jersey.

Nashua, N. H.

Shawsheen River, Andover, Mass.

This list does not include practice in the field of sewage treatment and in the treatment of industrial wastes. Much work has been done in this field particularly in Massachusetts and Rhode Island.

Neither does this list include a large amount of work done for various factories, clubs, hotels, parks, schools, office buildings, and private estates. Now over 13,000 analyses have been made in the laboratory at Boston. While most of the work listed has had to do with plants of less than 100,000 gals. daily capacity, the amount of work in the aggregate is large, and the experience gained thereby is important.

Neither does this list include over one hundred cases of treatment of sewage, nor other public health engineering work like the construction and supervision of swimming pools, the control of air-borne nuisances, or garbage and refuse disposal.

European Experience.

In addition to taking courses at the University of Berlin in 1897-1898, Mr. Weston made a special study of deferrization of iron removal plants in 1907-08 (see paper Journal Am. Soc. C. E. *64,* 112.) He also made studies of various European water supply and sewerage works at the same time.

Teaching Experience.

From 1912 to 1916, Mr. Weston was assistant professor of public health engineering (part time) at the Massachusetts Institute of Technology. During this period, the Sanitary Institute of the Massachusetts Institute of Technology made, under his direction, a study of the Coweeset River, an otherwise unpolluted stream which received the effluent of the Brockton sewage works.

Technical Papers.

Mr. Weston has written many technical papers which have appeared chiefly in the journals of the American Water Works Association, the New England Water Works Association, the American Society of Civil Engineers, the American Public Health Association and also in the "Engineering News-Record" and similar publications.

Book.

Mr. Weston is joint author of the "Water Works Handbook" (Flinn, Weston and Bogert), a standard treatise on the art of water supply.

Societies.

Mr. Weston is a member of the following professional and technical societies,—

Society	*Member since*
American Institute of Consulting Engineers, Director	1916
American Society of Civil Engineers, Past Chairman of San. Eng. Div.	1902
Boston Society of Civil Engineers—Past President	1903
Engineering Institute of Canada	1913
American Water Works Association	1898
New England Water Works Assoc., Pres.	1897
American Public Health Assoc., Fellow, and Chairman of Committee on Scope and Policy	1898
New England Sewage Works Association	1929
American Society for Municipal Improvements	1920
American Chemical Society, Past Chairman Northeastern Section	1894
American Institute of Chemical Engineers	1918
Society of Chemical Industry, Great Britain	1895
City Planning Conference	1920

Special Qualifications.

For the present case Mr. Weston's qualifications include his knowledge of the character of New England waters acquired by 30 years of practice and observation in this region.

He was engaged by the Metropolitan District Commission to make studies for presentation to the legislature when the matter of additional water supply was under consideration.

He has made many studies of the rivers of New England and elsewhere. Some of these studies have continued over periods of from ten to twenty years.

PROFESSOR EARLE B. PHELPS, an expert witness for Massachusetts.

Graduated Massachusetts Institute of Technology 1899 in the Department of Chemistry.

Assistant Bacteriologist, Massachusetts State Board of Health at the Lawrence Experiment Station engaged in investigation of water and sewage purification, 1899-1903.

Research Assistant, Assistant Professor, and Associate Professor, Massachusetts Institute of Technology 1903-1913. During this period associated with Professor Winslow at the Sanitary Research Laboratory dealing with investigations in sewage disposal, industrial waste disposal and stream pollution. Also during this period Assistant Hydrographer, U. S. Geological Survey engaged in field studies of stream pollution.

During the latter years consulting Sanitarian with offices in New York City. In this connection retained by the City of New York in conjunction with Colonel (now Brigadier-General retired) William S. Black to investigate pollution of New York Harbor and report upon a scheme of main drainage and sewage purification for the Metropolitan Area. Later engaged by the City in litigation before the United States Supreme Court, between the State of New York and New Jersey, relative to the pollution of New York Harbor.

Professor of Chemistry, Hygienic Laboratory, U. S. Public Health Service, 1913-19, in charge of investigations dealing with sewage disposal treatment, of industrial wastes, and of stream pollution. Assisted in planning the extensive investigations of the Ohio River which have been conducted continuously since that time and is, at present, member of Consulting Sanitary Engineer, International Joint Commission in charge of an investigation of the pollution of the boundary water between the United States and Canada and planning of remedial works required under the treaty.

In private consulting practice 1919-1924.

Professor Sanitary Science, College of Physicians and Surgeons, Columbia University, 1924 to date.

X. HENRY GOODNOUGH, an expert witness for Massachusetts.

Graduated from Harvard College 1882.

Engaged for a brief time in vacation on Boston main drainage work.

1883-1884 General railroad work in the west.

1885 Massachusetts Drainage Commission, making investigations and plans for the North Metropolitan sewerage system of Boston.

1885-1886 Boston main drainage system.

1886 Investigation and design of works for the improvement of Stony Brook in Boston.

1886-1895 Assistant Engineer, State Board of Health under Frederic P. Stearns, Chief Engineer.

1895-1914 Chief Engineer, State Board of Health.

1914-date Chief Engineer and Director, Division of Sanitary Engineering, Massachusetts Department of Public Health.

In connection with the work of the Board of Health:

1886 Assistant Engineer on investigations of Boston Water supply.

1887-1889 Re-investigation of the North Metropolitan Sewerage system.

1893-1895 Investigations for Metropolitan water supply.

1893-1894 Investigations for a design of Charles River dam and basin.

As chief engineer, beginning in

1895 Had charge of work of deepening and improving Concord and Sudbury rivers with rebuilding of necessary bridges.

1895-1897 Investigations for the improvement of the Neponset River and drainage of Fowl Meadows.

1895-1896 General charge of investigation for system of sewerage for Salem and Peabody.

1896-1898 Engineer, jointly with the late Frank W. Hodgsdon, of the town of Marshfield (Joint Board consisting of State Board of Health and Massachusetts Harbor and Land Commission).

1899-1900 In charge of further investigation of plans of the Metropolitan Sewerage Commission for a main sewer for the South Metropolitan District and a new outlet into the lower Boston Harbor.

1901 Investigation of the sanitary condition of the Sudbury and Concord rivers and the Meadows adjacent thereto.

1904 Investigation upon the disposal of municipal refuse in the city of Boston.

1906-1907 Improvement of Mystic River and Alewife Brook and design for a water supply for the city of Lynn.

1908 Investigation as to the best means of preventing the further pollution of Boston harbor by the discharge of sewage at Moon Island.

1909 Special studies upon the sanitary condition of various rivers.

1911-1915 Had charge of construction of works for deepening, straightening and enlarging the channel of the Neponset River, including the reconstruction of necessary bridges and water and sewer pipe crossings.

1913 Investigation of various rivers in Massachusetts.

1914 Preparation of design and plans for extension of the Metropolitan sewerage district in the Charles River valley.

1916 Jointly with engineer of the city of Lynn. Design of works for new sewerage system for that city.

1917-1920 Investigation upon the improvement of various rivers with plans therefor.

1919-1922 Engineer of the Joint Board, consisting of the Department of Health and the Metropolitan District Commission, in making investigations and preparing plans for the extension of the Metropolitan water supply system.

1923-1927 Various special investigations for a water supply for Lawrence, Methuen, Lowell, Salem, and other municipalities in Essex County and adjacent portions of Middlesex County.

1923-1925	Preparation of plans for a general sewerage system for Salem, Beverly, Danvers, Peabody, and certain Public institutions.
Since 1920	In charge of construction of works for water supply, sewerage, etc., for various public institutions.
Previous to 1920	Regulation of capitalization of rates and service of water companies.
1920 to date	Engineering adviser to the Department of Public Utilities on matters relating to water companies.
At present	Chairman of a board of engineers to investigate the pollution of Boston harbor and the necessity for an enlargement of the Boston main drainage and Metropolitan sewerage systems under a special commission made up of heads of departments of the State and the city of Boston.
1926 to date	Consulting engineer to the Metropolitan District Water Supply Commission.
1925 to date	Ex-officio member of the South Essex Sewerage Board appointed to carry out the plans designed by the Department of Health 1923-25.

Consulting engineer at different times

For the City of New York, sewerage.

City of Providence, R. I., water supply.
County of Los Angeles, sewerage.
Boston and Brookline, improvement of Back Bay Fens.
City of Boston, municipal waste disposal.

For many smaller places on various engineering matters.
Member of

American Society of Civil Engineers.
American Water Works Association.
New England Water Works Association (Honorary member).
Boston Society Civil Engineers.
Harvard Engineering Society (past president).
Society American Military Engineers.
American Meteorological Society.
American Geographic Society.

Member of various committees on engineering subjects.

Author of papers on various engineering subjects, including rainfall, stream flow, freshets, yield of watersheds, well water supplies, disposal of drainage, sewage and municipal refuse, etc.

Recipient of Dexter Brackett medal of the New England Water Works Association for 1921.

KARL R. KENNISON, an expert witness for Massachusetts (1832) designing engineer, Metropolitan District Water Supply Commission.

Graduated from the Massachusetts Institute of Technology in 1908.

With the exception of one year of teaching, has been practicing engineering since graduation.

Was for six years associated with John R. Freeman, consulting engineer, of Providence, R. I., rising to the position of principal assistant in charge of designs and estimates. This work included many projects for water supply and water power including reports on the development of the Mississippi River

at Keokuk, Iowa, and a report for the Hetch-Hetchy water supply for San Francisco.

During the war was supervising engineer of the Bureau of Yards and Docks of the Navy Department, and also with the Emergency Fleet Corporation in charge of shipyard construction in Mobile and New Orleans.

For six years following the war was engaged in private practice as consulting engineer in Boston on miscellaneous hydraulic problems, water supply, water power and flood control.

Since 1926 has occupied his present position.

JAMES F. SANBORN, an expert witness for Massachusetts. Age 53. Residence, 448 Riverside Drive, New York City.

Graduated—Lawrence Scientific School, Harvard University 1899, degree of S. B.

A resident of Massachusetts for 17 years.

For the past 31 years engaged continuously in engineering work. For the past 12 years as a consulting engineer on water supply and sanitary work. Office, 30 Church Street, New York City.

Previous to 1918 for 13 years an engineer for the City of New York on the development of the Catskill sources, a 600 million-gallon-per-day water supply for New York City.

Previously employed on the New York Subways and on mine and tunnel work.

Member: American Society of Civil Engineers.
American Institute of Consulting Engineers.
American Water Works Association.
New England Water Works Association.
New York Municipal Engineers.

FRANK A. BARBOUR, an expert witness for Massachusetts.

Business: Consulting Engineer, specializing in Water Supply and Sewerage, office Boston, Massachusetts.

Education: Graduate of University of New Brunswick.

Experience: After three years of railroad work became associated with the late Desmond Fitzgerald in work on the Boston water system, including investigation of additional supply.

Then for six years, at Brockton, Mass., in design and construction of sewage disposal plant—the last three years in charge of chemical laboratory at disposal plant. During this time made studies in connection with additional water supply for the city.

In 1900, with Mr. F. H. Snow, began private practice in Boston, continuing until 1906 with Mr. Snow, and since that time alone—with the exception of three years (1923-25) when Mr. G. G. Dixon was associated with him. For some ten years had a branch office at Columbus, Ohio.

Has been engaged largely in water supply and sewerage and has been retained in the investigation, design, and in the majority of cases, in the construction of some fifty water systems, and about the same number of sewerage systems this work being distributed through New England, New York, New Jersey, the middle west and Canada.

Among the water systems on which I have done work are the following:

Fall River, Mass.—Study of additional supply, reinforcement of distribution system, distribution reservoir, additional pumping equipment, the expropriation of the Lakeville Ponds, and the settlement of damages with power owners on the stream below.

New Bedford, Mass.—Consulting engineer to the New Bedford Water Board, work on additional supply, valuation of water power damages on the Nemasket River, construction of additional 60" lock joint concrete pipe intake—rate study involving valuation of system.

Lowell, Mass.—Various improvements, including construction of filtration plant, distributing reservoir, pumping station, pumps, studies of additional supply, reinforcement of distribution system.

Attleboro, Mass.—Additional supply, construction of dam, reinforcement of distribution system.

St. John, N. B.—Additional supply, dam, transmission mains, reinforcement of distribution system.

Woonsocket, R. I.—Studies of additional supply and improvement in distribution system.

Amherst, N. S.—Additional supply, dam and pumping equipment.

Peabody, Mass.—Additional supply, pumping plant, distribution reservoir.

Framingham, Mass.—Additional supply, pumping plant, distribution reservoir.

Marblehead, Mass.—Additional supply, pumping equipment, filter distribution storage and pipe system.

Reading, Mass.—Investigation of additional supply, storage, reinforcement of distribution system and investigation of probable future cost of water from Metropolitan District System.

Fredericton, N. B.—Filtration plant and reinforcement of distribution system.

Montreal, Canada.—Member of Commission to investigate structural conditions of filter plant.

City of New York—Member Special Commission on Filtration of Croton Supply.

Akron, Ohio.—Design and construction of supply, including dam, filtration plant, pumping equipment, transmission mains, distribution reservoir and reinforcement of distribution system.

In sewerage and sewage disposal, I have done work at Braintree, Maynard, Milford, North Attleboro, Needham, Hudson, Framingham, Marblehead, Taunton, Reading and Peabody, in Massachusetts: Lakewood, Mansfield, Sandusky, Cuyahoga Falls, Girard, Newark, Massillon, Wadsworth and Springfield, in Ohio: Atlantic City, Asbury Park and Monument Beach in New Jersey, Saratoga Springs in New York, West Chester, Pennsylvania.

I have also done considerable work in the developing of water supplies for and the disposal of manufacturing wastes of industries, including Goodyear Rubber Company, Goodrich Rubber Company, Columbia Chemical Company, American Glue Company, etc.

I have done considerable work in the valuation of water

powers in connection with water systems, such as those on the Cuyahoga River at Akron, Ohio.

In connection with the taking of the Lakeville Ponds by Fall River, New Bedford and Taunton, I represented the three cities in appraisal of water power damages on the Nemasket River.

I have for 30 years been engaged in work which has brought me into contact with the particular water resources involved in the present case. Thus, my work at Lowell, Milford, N. H., Laconia, N. H. and on investigation of power developments below Merrymeeting Lake, has made me familiar with the Merrimac River valley situation: early work on the Boston Water Supply and for Framingham, Reading and other adjacent communities, has given me intimate knowledge of the present Metropolitan system. During the Legislative hearings on the relative merits of the Ware-Swift and Hazen projects I represented Framingham, and thus have personal knowledge of the reactions of the legislature to these projects.

I am a member of the

American Society of Civil Engineers.
Canadian Institute of Engineers.
American Water Works Association.
New England Water Works Association (Past President).
Boston Society of Civil Engineers (Past President).
American Public Health Association.
American Society for Testing Materials.
American Society for Municipal Improvement.

I am a member of the Committee on Water Works Practice of the American Water Works Association, which supervises the work of all technical committees of that association.

WESTON E. FULLER, an expert witness for Massachusetts.

Graduate of Cornell University in 1900 with degree of C. E.

Instructor at Cornell University 1900-1902.

Resident engineer in charge of water works construction 1902-1907.

Member firm Hazen & Whipple Consulting Engineers 1908-1914.

Member firm Hazen, Whipple & Fuller Consulting Engineers 1914-1922.

Consulting Engineer 1922-date.

Professor of Civil Engineering, Swarthmore College 1922-1929.

Special Lecturer on water works Harvard University 1926.

Member American Society of Civil Engineers and American Water Works Association.

Have designed waterworks and sewers for many cities and had supervision of the construction. Some of these cities are Portland, Me.; Yonkers, Peekskill, Ogdensburg, Auburn, Poughkeepsie, Watertown, Long Beach, and Sea Cliff, New York; Miami and West Palm Beach, Florida; Springfield, Salem and Beverly, Mass.; Plainfield, Westfield, Camp Dix and Franklin Furnace, New Jersey; Palmerton, Pa.; Ottawa and Toronto, Ontario.

Have made investigation and reports on new supplies for water works and improvements to existing supplies and for improvement for sewer systems for many cities among which are, Elizabeth, Bayonne, New Brunswick, Plainfield, Paterson in N. J.; Ogdensburg, Watertown, Yonkers, Poughkeepsie, New-

burgh, Long Beach, Florida, Ottawa, Peterboro, Guelph, Ontario, Suffolk, Winchester, Newport News, Virginia; Salisbury, Maryland, Brandon, Manitoba, Piqua, Ohio, Long Branch, New Jersey.

Have also valued some thirty (30) waterworks properties, some of which are; Hackensack Water Co., Elizabethtown Water Co., Plainfield Union Water Co., Commonwealth Water Co., Tinter Manor Water Co., New York and New Jersey Water Co., Passaic Consolidated Water Co., which serves between 60 and 70 municipalities in New Jersey, Newport News Water Co., Dunham (N. C.) Water Co., Miami (Florida) Water Co., New York Interurban Water Co., Long Beach Water Co., Cortland (N. Y.) Water Co.

Have also valued a number of water power properties and water power sites; among these are Properties of the Susquehanna Power Co., at Conowongo on the Susquehanna River, Cohoes (N. Y.) Light and Power Co., several power sites of the Adirondack Power Co., ten sites on properties in the Catskill Mountains which were damaged by New York City in the development of its Catskill water supply, several power sites for the City of Providence, several power sites for the North Jersey Water District and others.

HARRISON P. EDDY, an expert witness for Massachusetts.

Graduated from the Worcester Polytechnic Institute in 1891.

Immediately entered the employ of the Worcester Sewer Department, having charge, as Superintendent, of the sewage treatment plant from the fall of 1891 for about one year. Elected by City Council of Worcester as Superintendent in charge of the Sewer Department in the fall of 1892, which position was held continuously for 15 years until the spring of 1907. Dur-

ing this period constructed by day labor all sewers and drains, approximating 100 miles in aggregate length; enlarged the chemical precipitation plant for sewage treatment; installed large sewage sludge dewatering plant; and constructed some 43 acres of intermittent sand sewage filters. Had charge of all maintenance and operation of the department, including the sewage treatment plant at which investigations and researches in stream pollution and treatment processes were carried on continually; and consulted with the Water Commissioner and City Engineer with reference to the local water supply problems.

In the spring of 1907 formed a partnership with the late Leonard Metcalf, under the firm name of Metcalf & Eddy. This partnership continued until dissolved by the death of Mr. Metcalf early in 1926, at which time a new partnership was formed with the engineers who had been taken into the former partnership and assistant engineers, the original firm name and the latter partnership being continued until the present time.

During this period of 23 years to date, have specialized in problems of water supply, water purification, stream pollution, sewage purification and industrial wastes treatment.

In 1910 and 1911, in collaboration with Messrs. John W. Alvord and the late Prof. George C. Whipple, as a commission appointed by Milwaukee, to investigate the problems of protecting the water supply derived from Lake Michigan and disposing of the municipal sewage, recommended the filtration of the water supply and the treatment of the sewage. The commission also recommended the immediate treatment of the water supply with chlorine derived from bleaching powder, this being one of the early installations for disinfection of water supplies with chlorine.

For the Metropolitan Sewerage Board of New York investigated the degree and extent of pollution of the harbor waters.

In 1911 and 1912 made a further investigation of the effect of the discharge of sewage into New York Harbor and testified before a master appointed by the U. S. Supreme Court to hear the case of New York versus New Jersey, relative to the discharge of the Passaic Valley sewage into New York harbor.

In 1912 in connection with the problem of disposing of the sewage of the city of Cincinnati, investigated the degree and extent of the pollution of the Ohio River water with reference to its use as a source of water supply by Cincinnati and other communities.

In 1916 and 1917, with George W. Fuller and the late Dr. Rudolph Hering, investigated the problem of sewage disposal for the city of Buffalo and the pollution of the Niagara River, with particular reference to its use as a source of the water supplies of communities further downstream.

From 1917 to 1921 advised the Milwaukee Sewerage Commission with reference to researches in methods of sewage treatment and the design of the sewage treatment plant, with particular reference to the cleaning of the rivers and the protection of the bathing beach waters and the municipal water supply.

In 1918 made an investigation of the problem of sewage disposal for the city of Cleveland, giving particular attention to the pollution of the waters of Lake Erie in the vicinity of the city.

Served the Sanitary District of Chicago in 1921 and 1922 on a commission comprising also Mr. George W. Fuller and Mr. T. Chalkley Hatton, appointed to report upon the lake lowering controversy in connection with which investigation and report the water supply problem was studied.

Again, assisted the District in Wisconsin et al. versus Illinois and the Sanitary District of Chicago, paying particular attention to the problem of protecting the water supply of the

city of Chicago from contamination by the sewage and industrial wastes of the city, giving consideration to methods of avoiding contamination and of purifying the water. Testified in the early hearings before the Special Master, Charles Evans Hughes, appointed by the United States Supreme Court, and again upon the re-reference of the case.

In 1925, in conjunction with Messrs. C. W. Hubbell and John H. Gregory, served on a commission to investigate and advise upon the problem of sewage disposal of the city of Detroit, in connection with which the effect of the sewage upon pollution of the Detroit River and the municipal water supply was given particular attention.

In 1925 and 1926 advised the city of Detroit with reference to the sewerage and storm water relief of the east side of the city and surrounding towns, comprising some 30 square miles, giving particular attention to the effect of the discharge of sewage and storm flows upon the easterly end of Lake St. Clair and the Detroit River, and the discharge of the storm flows in such a way as to reduce the pollution of these waters above the waterworks intake.

In 1929 made an exhaustive investigation of the pollution of Lake Ontario and tributary waters in the vicinity of Rochester, by the sewage of the city, with particular reference to the effect of the pollution upon the bathing beach waters, and advised the city with reference to improvement in its sewage treatment facilities.

During this period of nearly 40 years have de[illegible] continuously with problems relating to the effect of industrial wastes upon the waters into which they were discharged, upon their effect on the treatment of municipal sewage when mixed therewith, and the treatment of the wastes by themselves.

This experience covers almost continuous study, investigation and advice upon water supply problems involving up-

land, well, large river and Great Lake supplies, the removal of iron and oil, treatment with copper sulphate and with lime and filtration in various forms.

Have had direct charge of or supervised the operation of sewage, industrial wastes and water purification plants for many clients and am serving in this capacity at the present time.

Have served in an advisory capacity some 125 municipalities, including in addition to those hereinbefore mentioned, the cities of Boston, Cambridge, Concord (Mass.), Fitchburg, New Bedford, Springfield, Pawtucket, Hartford, Concord (N. H.), Syracuse, Schenectady, Louisville, Pittsburg, Allentown, Akron, Dayton, New Orleans, El Paso, San Antonio, Fort Wayne, Fort Worth, and Toronto, Canada.

During this experience of 40 years have been a constant student of sewage disposal and water supply problems in this country and abroad, having made several foreign trips for this purpose.

In collaboration with the late Leonard Metcalf have written "American Sewerage Practice," a three volume treatise upon sewage disposal, "Sewerage and Sewage Disposal," a textbook upon this subject, and many professional papers.

Am a member of the American Society of Civil Engineers (at present member of the Board of Direction), the American Institute of Consulting Engineers (Vice-President in 1925 and 1926), the Institution of Civil Engineers (British), the Institution of Sanitary Engineers (British), the Engineering Institute of Canada, the Boston Society of Civil Engineers (President in 1914), the American Water Works Association, the New England Water Works Association (Honorary Member), the American Public Health Association, the Society for Municipal Improvements, the American Chemical Society, and others.

GEORGE W. FULLER, an expert witness for Massachusetts.

I reside in New York City; am 61 years old; and am an engineer specializing in water supply and water purification matters, sewerage drainage and treatment works for domestic and industrial wastes. I make investigations and reports for new sources of water supply and extensions to existing works; also prepare plans and specifications and supervise the construction and operation of water supply works.

I was graduated from the Masschusetts Institute of Technology in 1890 and took special courses in bacteriology at Berlin. Then I spent about nine years in research work related to methods of purifying water and sewage from engineering, chemical and bacterial viewpoints. For about one-half of this period I was a member of the technical staff of the Massachusetts State Board of Health and during the remainder I was in charge of investigating means of purifying the muddy and polluted Ohio River water at Louisville and Cincinnati.

From May '91 to September '95 I lived at Lawrence and was employed at the experiment station there of the Massachusetts State Board of Health. I had previously been an assistant of Professor Sedgewick during the winter of 1890-91 when he was investigating typhoid epidemics in Lowell and Lawrence. I assisted in tests made whereby Lowell substituted a well water supply for the polluted Merrimac River water and Lawrence constructed filters which were put in service in September '93. During this period I also assisted in securing data for the State Board in reference to its 1895 report on the Metropolitan Water Supply.

Following my four years in Louisville and Cincinnati, I opened an office in New York and have since been engaged in private engineering practice. I was a member of the firm of Hering and Fuller 1901-1911 and have been a member of

Fuller and McClintock since 1916. During the past thirty year, I and my organization have advised some 150 of the larger cities and towns in this country on matters of water supply and about an equal number in matters of sewerage and sewage treatment. We have made valuations of some sixty water works plants and since 1917 I have devoted a substantial portion of my time to valuation matters related to street railway properties. Since 1920 I have been a member of the Valuation Board of the Mitten Management which operates the properties of the Philadelphia Rapid Transit Co. and the International Railway Co., operating in the Buffalo district and each side of the Niagara River.

I was a member of a board of engineers at New Orleans 1900-09 during which the city built new systems of water works, sewerage and drainage. I have made investigations and reports on new water supply projects for Springfield, Mass., Montreal, Albany, New York, Philadelphia, Pa., Jacksonville, Florida, Memphis, Tenn., Toledo, Ohio, Grand Rapids and Battle Creek, Michigan, St. Louis and Kansas City, Missouri, Denver, Colorado, etc.

I particularly had to do with the selection of type, design and supervision of construction and operation of numerous sizable water purification plants such as those at Louisville, Cincinnati, Little Falls, (East Jersey Water Co.) Hackensack Water Co. plant at New Milford, New Jersey, Philadelphia, Baltimore, Washington, Richmond, Memphis, Dallas, New Orleans, Kansas City, Minneapolis, Buffalo, Montreal, and many other smaller plants.

From 1906 to date I have been a consultant to the New York Board of Water Supply in matters related to quality of water, have served Jersey City as consultant and have made several investigations into programs for securing better upland sources of supply for Philadelphia. On matters of sewerage and sewage disposal, I have made investigations and reports at

New Orleans, Atlanta, Columbus, Ohio, Indianapolis, Toledo, Reading, Pa., Passaic Valley in New Jersey and for the city of New York in 1913 and again in 1928. I am now engaged in the design of a sewage treatment plant for New York City having a capacity of 180 m.g.d. and located on Ward's Island in East River.

At Chicago, I have been connected with the local drainage canal project for twenty-five years. I testified in 1903-04 in the Missouri case; in the federal suit in 1913 and in the so-called Wisconsin suit, now pending before the U. S. Supreme Court, in 1927. In 1924-25 I was Chairman of a board of twenty-eight engineers which investigated and reported upon a program for the sanitary district of Chicago. I also reported on this subject to the International Deep Water Commission in 1906. From 1914-17 I advised the International Joint Commission in matters of policy related to the control of pollution of international boundary waters in accordance with the provisions of the 1909 Treaty between Great Britain and the United States.

I was consulting Engineer 1927-28 to the New Jersey State Water Policy Commission and assisted in drafting a tri-state pact for consideration by the states of New York, New Jersey and Pennsylvania for the allocation of the waters of the Delaware River.

I am now engineer for the North Jersey District Water Commission in charge of the Wanaque Aqueduct construction for delivering upland water to Newark and associated cities.

As to the disturbance of water supplies, even where filters are installed, by industrial wastes we have had experience with wood pulp wastes at Richmond, Virginia; wood alcohol wastes at Warren, Pa.; and mine water drainage at the Mountain Spring Water Company of the Pennsylvania Railroad; phenol wastes at Milwaukee, Chicago, etc., etc.

I have had considerable to do with joint undertakings for groups of municipalities in matters of water supply, sewerage, and the disposal of industrial and domestic wastes. I am familiar with difficulties in finding practical solutions for these joint undertakings and the complications which relate to interstate and international jurisdictions. I have considered these matters as to history of the development of administrative practices in Europe for control of pollution of water supplies in the course of ten or more visits to Europe.

I am author of "Water Purification at Louisville", 1898; "Sewage Disposal", 1912; and in connection with my partner, J. R. McClintock, "Solving Sewage Problems", 1926.

I am past president of the American Water Works Association and the American Public Health Association.

J. WALDO SMITH, an expert witness for Massachusetts (2166) was graduated from Massachusetts Institute of Technology in 1886.

Has received the honorary degree of Doctor of Engineering from the Stevens Institute of Technology and the degree of Doctor of Science from Columbia University.

Awarded the John Fritz medal of the National Engineering Societies for "achievement as engineer in providing the City of New York with a supply of water".

The Washington Award for pre-eminent services in promoting the public welfare was conferred on him by the Western Society of Engineers in 1925, "for the rare combination of vision, technical skill, administrative ability and courageous leadership in engineering."

Is consulting engineer to the Board of Water Supply of the City of New York and to the Metropolitan District Water Supply Commission of Boston.

Has acted as consulting engineer in connection with the water supplies of Providence, Rhode Island; Kingston, New York; Catskill, N. Y.; Philadelphia, Pennsylvania; Ashville, North Carolina; Government of Cuba with particular reference to Havana; Kansas City, Missouri; Vancouver, B. C.; San Francisco, California; East Bay Municipal Utility District, Oakland, California and other places.

Was consulting engineer on the Moffatt Tunnel, Denver, Colorado.

Was consulting engineer to the Massachusetts Joint Board which in 1922 reported relative to the water supply needs and resources of the Commonwealth (Complainant's Exhibit No. 1).

In 1903 he was appointed Chief Engineer of the Aqueduct Commissioners of the City of New York.

In 1905 he was appointed Chief Engineer of the Board of Water Supply of the City of New York, which position he held until 1922, since which time he has been consulting engineer to that Board. The Catskill Supply developed by this Board was designed and constructed under his leadership at a cost of about $180,000,000, during a period of about 10 years.

JOSEPH A. MC CARTHY, an expert witness for Massachusetts (1765) assistant at Lawrence Experiment Station of Massachusetts Department of Public Health.

He has been connected with this station since 1910 except during the war. The Lawrence Experiment Station operates

experimental water and sewerage plants of all kinds for the solving of problems of water and sewerage purification encountered by cities, towns, corporations and individuals of the Commonwealth.

CHARLES D. HOWARD, an expert witness for Massachusetts (1643) chief of the Division of Chemistry and Sanitation, New Hampshire Board of Health.

A graduate of Worcester Polytechnic Institute with a degree in chemistry in 1893.

1893 to 1895 was private assistant to Dr. Walcott Gibbs, Newport, R. I., and to Professor Kinnicutt of Worcester Polytechnic Institute.

1895 to 1898, assistant chemist at the State of New Hampshire Experiment Station.

1898 to 1905 was assistant chemist and later associate chemist at the West Virginia University Experiment Station, where he was identified with an investigation of the pollution of the Monongahela River.

Since 1905 he has occupied his present position.

WILLIAM F. UHL, a consulting engineer, educated at Michigan State College, and a member of the organization Charles T. Main, Incorporated, for over twenty years. This organization, which has been in business under the leadership of Mr. Charles T. Main for thirty-five years, does a general engineering practice, including the designing and supervision of construction of steam, electric and water power plants, and of industrial plants and textile mills. Some of the more import-

ant power developments for which it has acted as consulting engineer or which were designed and supervised by it include the hydro-electric developments of the Montana Power Co., in Montana, since 1909; those of the Georgia Railway and Power Co. over a period of about twelve years; the Conewingo development on the Susquehanna River; and the Fifteen Mile Falls development of the New England Power Company on the Connecticut River. Many other smaller power developments throughout New England and other states, like that of the Rockland Light and Power Company in New York State have been designed and supervised also. Charles T. Main, Incorporated, has acted as consulting engineer for some of the lessees of the water power companies at both Lowell and Lawrence on the Merrimac River and for the Holyoke Water Power Company at Holyoke on the Connecticut River.

Benjamin W Alling
Attorney General of the State
of Conn:
By Benedict and Loeser
Special Counsel,
Joseph E. Warner
By Daniel J. Callahan

FILE COPY

JAN 16 1928
ELMORE GROPLEY
CLERK

Supreme Court of the United States

JANUARY TERM, 1928

No. 14 Original

THE STATE OF CONNECTICUT, COMPLAINANT

v.

THE COMMONWEALTH OF MASSACHUSETTS, DEFENDANT

IN EQUITY

MOTION FOR LEAVE TO FILE BILL IN EQUITY
BILL OF COMPLAINT

BENJAMIN W. ALLING,
Attorney General of the State of Connecticut and Solicitor and Counsel for the Plaintiff.

ERNEST L. AVERILL,
Deputy Attorney General of the State of Connecticut

BENEDICT M. HOLDEN,
of Counsel.

THE CASE, LOCKWOOD & BRAINARD CO.
HARTFORD, CONN.

Supreme Court of the United States

JANUARY TERM, 1928

THE STATE OF CONNECTICUT, COMPLAINANT,

v.

THE COMMONWEALTH OF MASSACHUSETTS,
DEFENDANT

IN EQUITY

MOTION FOR LEAVE TO FILE BILL IN EQUITY
BILL OF COMPLAINT

MOTION FOR LEAVE TO FILE BILL IN EQUITY

The State of Connecticut, by its attorney-general, appearing in that behalf by and with the authority, consent and direction of the governor of said state, comes now here and presents this its motion for leave to file in this court a bill in equity against the Commonwealth of Massachusetts, and to have process issued thereon. A true copy of said bill is herewith exhibited to the court, and forty copies thereof are now on file with the clerk of this court. And as grounds of this motion, the said State of Connecticut, complainant, shows to this honorable court:

1. That the State of Connecticut and the Commonwealth of Massachusetts are each one of the original states of the United States of America.

2. That the controversy between the State of Connecticut and the Commonwealth of Massachusetts is of a civil nature and properly justiciable before this honorable court as will more fully appear in the allegations of this bill in equity hereto attached.

THE STATE OF CONNECTICUT,
By BENJAMIN W. ALLING,
Its Attorney-General.

ERNEST L. AVERILL,
Deputy Attorney-General.

BENEDICT M. HOLDEN,
of Counsel.

Supreme Court of the United States

JANUARY TERM, 1928

NUMBER ORIGINAL

THE STATE OF CONNECTICUT, COMPLAINANT,

v.

THE COMMONWEALTH OF MASSACHUSETTS, DEFENDANT

IN EQUITY

MOTION FOR LEAVE TO FILE BILL IN EQUITY BILL OF COMPLAINT

BILL OF COMPLAINT

TO THE HONORABLE THE CHIEF JUSTICE AND THE ASSOCIATE JUSTICES OF THE SUPREME COURT OF THE UNITED STATES:

Your orator, the State of Connecticut, and one of the States of the United States of America, by Benjamin W. Alling, its Attorney General, presents this bill of complaint against the Commonwealth of Massachusetts, also one of the States of the United States of America, by virtue of the direction and authority contained in a joint resolution of the General Assembly of the State of Connecticut, approved on the 8th day of June, 1927, a copy of which joint resolution is hereto attached, marked Exhibit "A," and as fully made a part hereof as if copied herein, and also by the special direction and authority of the Governor of the State of Connecticut

as provided in said act; and thereupon your orator complains and says:

The State of Connecticut was one of the "Thirteen Original Colonies," which, by covenant, constitution, contract and agreement, created the United States and imposed and conferred upon it its governmental powers and duties, which said State, as one of the thirteen original States, was then a body politic organized and maintained for the purpose of promoting the happiness, prosperity and well-being of the people residing within its territorial limits, and had succeeded to all the various rights, properties, duties and obligations conveyed or created by charter granted in 1662, by King Charles II, King of Great Britain, a sovereign of the nation then owning the lands, waters, and other properties which are now comprised within the territorial limits of the State of Connecticut, and which then included and still includes a great portion of the Connecticut River, all of which portion of said river included within the territorial limits of the State of Connecticut is a navigable stream.

The defendant, the Commonwealth of Massachusetts, was one of the thirteen original colonies which, by covenant, constitution, contract and agreement, created the United States and imposed and conferred upon it its governmental powers and duties, which said state, as one of the thirteen original states, was then and still is a body politic organized and maintained for the purpose of promoting the happiness, prosperity and well-being of the people residing within its territorial limits, which includes a portion of the Connecticut River and many of the tributaries of said Connecticut River including the Swift, Ware and Miller Rivers, and Deerfield, Westfield and Quaboag Rivers, which empty and discharge their respective waters

into the Connecticut River and contribute to maintain the flow of said Connecticut River, which contributions and flowage from the above named tributaries are necessary to maintain and preserve the flow of the Connecticut River.

The State of Connecticut and the Commonwealth of Massachusetts have, by virtue of their respective sovereignties and by the rules of law recognized and applied in each of the said sovereign states, exclusive control and power of regulation of all waters within the territorial limits of said respective states, and both of said states have recognized as law for the government of the citizens in each of said states the right of riparian owners to the undiminished flowage of all streams within the territorial limits of each of the states, which flowage is to be free from contamination or burden of any kind placed upon it by other riparian owners wheresoever they may be situated, subject to the rights which have been conferred upon the United States of America in the interests of interstate commerce to preserve and protect the navigability of all streams wherever the same may be situated.

In compliance with the duty placed upon it by the compact between the original states, the United States has assumed the care and control of all navigable rivers and placed the immediate duty of exercising such care and control in the War Department of the United States government and the office of the Secretary of War, and the acts and things hereinafter complained of, constituting as they do an interference with interstate commerce by affecting the navigability of the said Connecticut River, necessitates that permission should be obtained from the War Department and the office of the Secretary of War of the United States before any of the acts and things hereinafter complained of can be lawfully done by the Common-

wealth of Massachusetts, which permission has not been obtained.

The Connecticut River rises in the Connecticut Lakes in northern New Hampshire and flows southward between New Hampshire and Vermont and across Massachusetts and Connecticut into Long Island Sound and is the largest river in New England, being about 345 miles long, and drains an area of 11,300 sq. miles, 2720 of which are within the state of Massachusetts and 1430 are in the State of Connecticut; and falls about 1900 ft. from its head waters in Connecticut Lakes to Long Island Sound. The mean annual precipitation in the Connecticut Valley is about 40 inches, ranging from about 45 inches at Hartford to about 35 inches in the upper portions; and the United States government has found the Connecticut River to be a navigable stream from Springfield, Massachusetts, to Long Island Sound, and all of that portion of said river below Hartford is in constant use as a means of transportation for passengers and freight on which a line of steamships carrying passengers between Hartford and New York makes two trips daily, and the citizens of Connecticut and the industries located throughout the Connecticut valley and elsewhere receive coal, merchandise and all classes of freight by means of this avenue of transportation, and there are a large numbers of sloops, yachts and pleasure craft maintained and used thereon.

The Ware, Quaboag and Swift Rivers join at Three Rivers in the Commonwealth of Massachusetts into what is known as the Chicopee River. Ware River drains about 221 miles of drainage area, rising in the town of Westminster in Worcester County, flows southwesterly ten miles to New Boston, where it turns and flows northwestward to Barre Falls, from which

place it flows in a general southwestward course to Three Rivers, where it receives the Quaboag, and thence southerly west of the City of Chicopee, where it enters the Connecticut River, a distance of approximately 60 miles, with a drainage area of 221 sq. miles.

Swift River has three main drainings, one of which rises in North Pond in the town of Orange, Mass., and flows southward; joined by another drainage two miles above the town of Enfield, Mass., and the two are joined by another drainage one and a half miles below the said town of Enfield, below which point it joins the Ware River. The length of the Swift River from the North Pond to the point of its juncture with the Ware River is about 30 miles and has a drainage area of about 213 square miles.

Quaboag River flows from Quaboag Pond in the town of Brookfield, Mass., in a southwesterly direction to Three Rivers and is about 23 miles in length, draining an area of about 210 sq. miles.

All of the country drained by these tributaries of the Connecticut River is hilly and the slope of the various rivers averages about 15 ft. to the mile. Many lakes and ponds drain into this river through numerous small tributaries and the minimum flow is well sustained by natural drainage and filtration. These rivers discharge a large and valuable and necessary supply of water into the Connecticut River, and any diminution in the amount of this discharge seriously affects the flow of the Connecticut River, interferes with and destroys the navigability of said Connecticut River, and by taking away this natural, well-sustained and usual contribution to the Connecticut River seriously affects and destroys the fertility of the soil adjoining and in the watershed drained by said Connecticut River and its tributaries.

The State of Connecticut is the owner of the bed of the Connecticut River within the State of Connecticut, which stream, as hereinbefore set forth, is a navigable river, and the State of Connecticut is entitled to have the waters of said stream delivered from the Commonwealth of Massachusetts undiminished in volume. The construction of the bed of the Connecticut River situated within the territorial limits of the State of Connecticut is such that the entire accustomed normal flow of the river assisted by flood waters and the discharge of tributary rivers at flood seasons of the year are necessary to maintain the navigability of the Connecticut River and keep said river free from sand bars and other formations which would obstruct the channel and interfere with the navigability of said stream; and any diminution from the natural flow of said river or removal of flood waters would result in a slow, sluggish flowage of said river and permit and cause sand bars to be formed, debris to collect and in divers other ways interfere and eventually destroy the navigability of said river within the territorial limits of the State of Connecticut.

The State of Connecticut is the owner of a certain tract of land situated on the west bank of the Connecticut River at the city of Middletown within said state, upon which is located the Connecticut State Hospital for the Insane, and as such riparian owner, the State of Connecticut is entitled to the usual and accustomed flow of the stream, including the flood waters thereof undiminished in volume and uncontaminated as to purity and to all other rights which in the State of Connecticut and the Commonwealth of Massachusetts are usual and incident to riparian ownership.

The State of Connecticut is charged with the duty of promoting and safeguarding the interests and the welfare of its

citizens and protection of property within the territorial limits of the state; and property and persons situated or living in or having interests in the Connecticut Valley so called are all of them injuriously affected by the acts and things contemplated and threatened to be done by the Commonwealth of Massachusetts which acts and things are more fully described hereinafter.

The Connecticut River flows through a portion of the State of Connecticut commonly designated as the Connecticut Valley, from Springfield, Mass., to Saybrook, Conn., where it empties into Long Island Sound, an arm of the Atlantic Ocean, and there is a vast area of watershed on either side of said Connecticut River which has from time immemorial received the benefits of the flood waters of the Connecticut River, which at various times throughout the year completely inundates land adjoining said river on both sides, and because of this natural and periodical inundation, the rain precipitation on all of the land comprising and forming a part of the Connecticut Valley is held back, and through the forces of nature and in the natural course of the laws of nature, this precipitation percolates gradually through the soil to the bed of the river, and in consequence thereof creates and maintains a large area of fertile tillable land within the boundaries of the state of Connecticut, which fertility will be seriously affected, if not destroyed, by the action contemplated by the Commonwealth of Massachusetts, as hereinafter set forth.

From time immemorial there has from time to time occurred, and especially in the winter and spring time of each year, large floods or freshets of water in said Connecticut River, and at each of said floods or freshets the water in its natural course spread over and covered the thousands of acres of land located on the banks of the Connecticut River, and deposited

thereon sediment and other substances which were very valuable to the hundreds of owners of said lands as fertilizers of said land, and by reason of the aforesaid waters and sediment covering said land from time to time as aforesaid, said land was rendered very valuable for farming purposes and especially for the raising of tobacco, hay and vegetables of all sorts. All of said lands are situated within the State of Connecticut and the owners thereof are citizens of the State of Connecticut.

The State of Connecticut is thickly populated and has large agricultural and industrial enterprises and interests located in that area known as the Connecticut Valley, all of which is drained by the Connecticut River. And beyond the borders of the state of Connecticut, and for many miles within the territorial limits of the Commonwealth of Massachusetts, there is a large watershed which is drained by the said Connecticut River, and cities and towns, factories, and riparian owners generally, discharge sewage, offal and waste matter in such manner that it is emptied into and carried away and disposed of by the waters of the Connecticut River. All of which acts and things have been done by reason of the natural topography of the country, and all of which necessitates that the natural flow of the Connecticut River, including the flood waters, should remain undiminished and unimpeded. And in view of the uses which have been made of the Connecticut River and the Connecticut Valley adjacent thereto, and which are still being made of said river and valley by the Commonwealth of Massachusetts and the municipalities within the territorial limits of the Commonwealth of Massachusetts, and the inhabitants within the territorial limits of the State of Connecticut, any interference with the flow of the Connecticut River, or diminution in the volume of water discharged into it or carried by it will seriously affect the health of the citizens of the State of Connec-

ticut and cause great sickness and suffering, and make possible disease and epidemics, and cause irreparable damage to the State of Connecticut and the citizens thereof, for which there is no adequate remedy at law.

The Commonwealth of Massachusetts threatens and intends and has already expended large sums of money in making plans, preparing specifications, advertising for bids from contractors and doing all such further acts and things as are usual and incident to carrying out of its said plans to divert the waters from the tributaries of the Connecticut River hereinbefore described as the Swift River, the Ware River and the Miller River, from their natural flow into the Connecticut River and convey said waters by means of conduits, aqueducts and tunnels from the watershed of the Connecticut River into the Wachusett reservoir near the city of Worcester, in the Commonwealth of Massachusetts, in such manner that not any of the water so diverted, stored, carried and discharged will be again discharged or released into the Connecticut River or into any portion of the watershed drained by the Connecticut River or any of its tributaries, but will be taken away and lost forever as a part of the Connecticut River, to the great damage of the State of Connecticut and the citizens thereof and to the property within the territorial limits of said state and to the damage and destruction of the vested right which the State of Connecticut has in said waters, for which there is no adequate remedy at law; and said diversion would eventually eliminate all of the water so taken from the Connecticut River or any of its tributaries and from the Connecticut Valley and from any of the drainage area included within the watershed of the Connecticut River or any of its tributaries, and will destroy property and property rights of the citizens of the

State of Connecticut located within the territorial limits of the state, all of which it is the duty of the State of Connecticut to protect; and will seriously menace the health of the residents of the State of Connecticut, and the residents of the State of Connecticut have no adequate remedy at law to provide for the protection of their interests in the premises.

The Commonwealth of Massachusetts has made extensive surveys, perfected elaborate plans and proceeded to carry their plans into execution without any notice whatever to the State of Connecticut and without any attempt whatever to ascertain the nature and extent of the damage which such taking and diversion may occasion to the State of Connecticut or the property owned by the State of Connecticut or to the citizens or the interests and welfare of the State of Connecticut, which it is the duty of the State to foster and protect. The State of Connecticut, upon its own initiative and after inquiry which it has set on foot, ascertained and, therefore, avers that the taking of the Swift, Ware and Miller Rivers is but a portion of a general plan adopted by the Commonwealth of Massachusetts for the acquisition of the waters of the Deerfield, Westfield and Quaboag Rivers, which would leave the Connecticut River with very little if any water flowing therein from Springfield, Massachusetts, to Saybrook, Connecticut, and would take away all of the flood waters to which the State of Connecticut and its inhabitants are entitled and which are necessary for its health and maintenance as hereinbefore set forth, and would so seriously diminish the normal flow as to entirely destroy all navigation on the Connecticut River.

In addition to the diversion of the Swift River, Ware River, Miller River, Deerfield River, Westfield River and Quaboag River, the Commonwealth of Massachusetts has vari-

ous other plans and has under construction conduits, reservoirs and tunnels for the diversion and storage of water from other tributaries of the Connecticut River, which water is subsequently turned into the Connecticut River in a polluted condition, all of which acts and things make it necessary that there should be no diminution in the flow of the Connecticut River or any interference with the flood waters which come down through the Connecticut valley, all of which natural flowage of the River and flood waters are necessary to care for and dispose of the large amount of sewage and other deleterious matters which is being collected in large volume and discharged into the bed of the Connecticut River to be carried by it through the State of Connecticut.

The Commonwealth of Massachusetts threatens and intends, and has already let contracts and erected constructions to immediately divert the waters of the Ware River, Swift River and Miller River and unless enjoined from so doing will effectually and for all time remove the waters of said tributaries from the Connecticut River; and unless the power of this court be invoked the Commonwealth of Massachusetts will divert said waters and take the rights and property of the State of Connecticut and its citiens and seriously menace the health of the citizens of the State of Connecticut and do irreparable damage to the State of Connecticut and its citizens.

The Commonwealth of Massachusetts, in pursuance of its plans, threatens and intends to take the property of the State of Connecticut and to destroy and irreparably damage the property of the State of Connecticut and of its citizens, all of which is contrary to law and without due process of law, and is an attempt on the part of one sovereign state to take and destroy or damage the property of another sovereign state.

Prior to the formation and development of the plans for the taking of the waters as hereinbefore set forth, cities and towns within the territorial limits of the Commonwealth of Massachusetts acting with the consent and permission of the Commonwealth of Massachusetts have constructed sewer systems which together with the discharge of acids and other deleterious substances from a large number of mills and industrial plants located within the Commonwealth of Massachusetts are emptied and discharged into the Connecticut River, and carried by it through the State of Connecticut. And notwithstanding the plans and specifications for taking water from the Connecticut River, the Commonwealth of Massachusetts still permits the discharge of sewage and offensive matters into the Connecticut River, which sewage and other substances so discharged cannot be carried away and removed unless the normal flow of the river is maintained and the periodical discharge of flood waters is permitted to augment said normal flow and cleanse and purify the Connecticut River and the banks and property adjacent thereto.

Your orator represents the interests and welfare of a large portion of its inhabitants situated on the banks of the Connecticut River, including the cities of Hartford and Middletown, all of whom will be injuriously affected by any serious interference with the usual and customary flow of the stream as it passes through the state. Particularly is this true inasmuch as the waters of this stream as delivered into Connecticut from the Commonwealth of Massachusetts are polluted with the sewage of municipalities and private citizens and the refuse of manufacturing plants situated upon the stream within the Commonwealth of Massachusetts. Any appreciable interference with the normal flow of the stream and especially to re-

move the beneficial effects of the scouring of the river by the flood waters at certain times in the year will mean serious concern to the health and welfare of thousands of inhabitants of the state who live along the banks of the stream, and particularly in the cities of Hartford and Middletown.

Your orator further represents that under the common law of riparian ownership which was recognized in both the State of Connecticut and the Commonwealth of Massachusetts from their earliest history, the State of Connecticut has the vested right as a sovereign to the waters of the Connecticut River as nature intended they should flow into the state and such vested right cannot be taken from your orator.

In consideration whereof, and for as much as your orator and its citizens and residents who except by representation by your orator have no remedy and can only have adequate relief in this honorable court, your orator on its own behalf and also as *parens patriae*, trustee, guardian and representative of that great proportion of its citizens, who are directly affected by the acts of the defendant hereinbefore set forth, prays this honorable court to take cognizance of the general charges set forth in the premises.

WHEREAS your orator needing relief prays:

1. That the said Commonwealth of Massachusetts, its servants and agents and each and every of them may be made defendants to this bill of complaint, and that they and each of them may be compelled to answer each and every allegation therein contained, but not under oath, the answer under oath being expressly waived.

2. That it be adjudged and decreed that neither your orator nor any of its citizens and residents have an adequate remedy at law for the injury which will result from the en-

forcement of said acts and that such injury would be irreparable.

3. That the said defendant, its officers, agents and servants and each of them may be restrained from committing any of the acts and deeds herein complained of and from any violation of the rights of your orator or of its citizens and residents in the premises, by a writ of injunction, issuing out of and under the seal of this honorable court, perpetually enjoining and restraining the said defendant, its respective officers, agents, servants, attorneys, workmen and employees, from in any way interfering with the natural and customary flow of the waters of the Connecticut River and of any tributaries thereto and particularly as to the Swift, Ware, Miller and Quaboag Rivers and Beaver Brook and of the flood waters thereof.

4. That this honorable court may grant your orator such other and further relief as the equity of the case may require whether specifically prayed for herein or not, and which to your Honors may seem just and proper in the premises.

5. That it may please your Honors to grant unto your orator not only a writ of injunction conformable to the prayers of this bill, but also that a writ of subpoena of the United States of America be issued out of and under the seal of this court, directed to the Commonwealth of Massachusetts, its officers servants and agents, to be served upon the Governor of said Commonwealth of Massachusetts and the Attorney-General thereof, commanding said defendant on a certain day to be named therein, and under a certain penalty, to be and appear before this Honorable Court, and then and there to answer, but not under oath, answer under oath being waived, all and singular the premises, and to stand to, perform, and abide such order, direction and decree as may be against said defendant in the

premises and as may be required by the principles of law, equity and good conscience.

THE STATE OF CONNECTICUT
By BENJAMIN W. ALLING,
Its Attorney General.

And your orator will ever pray.

ERNEST A. AVERILL
Deputy Attorney General
BENEDICT M. HOLDEN
of Counsel

EXHIBIT "A"

AN ACT CONCERNING THE USE OR DIVERSION OF WATER OF STREAMS WITHOUT THE STATE TRIBUTARY TO STREAMS WITHIN THE STATE.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

Section 1. The attorney general is authorized to investigate and, with the approval of the governor, to take such action as shall be deemed necessary to protect the state from damage by diversion or other interference with water from streams without the state which enter or are tributary to streams flowing within the state.

Sec. 2. The attorney general is authorized, with the approval of the board of finance and control, to negotiate and contract, in the name of the state, with any commission appointed by another state, or with any duly authorized agent thereof, concerning the use, allocation or diversion of any water from streams or tributaries without the state of streams which in their natural course flow through, into or across the state.

Sec. 3. This act shall take effect from its passage.

Approved June 8, 1927.

County of Hartford } ss.
State of Connecticut }

Benjamin W. Alling, being first duly sworn, says that he is the Attorney General of the State of Connecticut, and that he has resided in said state for many years past; that he is well acquainted with the facts and circumstances set forth in the

foregoing bill of complaint; that he has read the same and knows the contents thereof, and that the same is true of his knowledge, except as to matters therein stated upon information and belief and as to such matters he believes the same to be true.

Benjamin W. Lewis.

Sworn to before me and subscribed in my presence, this 21st day of December, A. D. 1927.

Helen E. Kelly

Notary Public in and for
the State of Connecticut

FILE COPY

Office Supreme Court, U.
FILED
APR 15 1929
CHARLES ELMORE CROPLEY
CLERK

In the Supreme Court of the United States

OCTOBER TERM, 1927

Original No. 13

STATE OF CONNECTICUT

v.

COMMONWEALTH OF MASSACHUSETTS

IN EQUITY

MOTION FOR LEAVE TO FILE — MOTION TO CITE IN SECRETARY OF WAR AND CHIEF OF ENGINEERS AS PARTIES RESPONDENT.

BENJAMIN W. ALLING,
Attorney-General of the State of Connecticut.

OF COUNSEL,
ERNEST L. AVERILL,
Deputy Attorney-General.
BENEDICT M. HOLDEN,
Special Counsel.

THE CASE, LOCKWOOD & BRAINARD CO.
HARTFORD, CONN.

In the
Supreme Court of the United States

OCTOBER TERM, 1927

Original No. 14.

IN EQUITY

STATE OF CONNECTICUT

v.

COMMONWEALTH OF MASSACHUSETTS

MOTION FOR LEAVE TO FILE — MOTION TO CITE IN SECRETARY OF WAR AND CHIEF OF ENGINEERS AS PARTIES RESPONDENT.

The State of Connecticut, by its attorney-general, appearing in that behalf by and with the authority, consent and direction of the governor of said state, comes now here and presents this its motion for leave to file in this court a motion citing in the Secretary of War and the Chief of Engineers as parties respondent, and to have process issued thereon. A true copy of said motion is hereto attached.

STATE OF CONNECTICUT,
By BENJAMIN W. ALLING,
Its Attorney-General.

ERNEST L. AVERILL,
Deputy Attorney-General.
BENEDICT M. HOLDEN,
of Counsel.

Supreme Court of the United States

OCTOBER TERM, 1927

NUMBER 14 — ORIGINAL

THE STATE OF CONNECTICUT, COMPLAINANT,

v.

THE COMMONWEALTH OF MASSACHUSETTS, DEFENDANT

IN EQUITY

MOTION TO CITE IN THE SECRETARY OF WAR AND THE CHIEF OF ENGINEERS AS PARTY RESPONDENTS AND FOR AN INJUNCTION

The State of Connecticut appearing herein by its Attorney-General, who appears as Attorney-General of the State of Connecticut by and with the authority, consent and direction of the Governor and the General Assembly of the State of Connecticut comes now here and presents its motion to this Honorable Court and says:

1. That the original bill of complaint, in which the State of Connecticut is Complainant and the Commonwealth of Massachusetts is Respondent, was filed by order of this Honorable Court at the October Term, 1927.

2. One of the averments in said original bill, filed as aforesaid, is as follows:

> "In compliance with the duty placed upon it by the compact between the original states, the United States has assumed the care and control of all navigable rivers and placed the immediate duty of exercising such care and control in the War Department of the United States

government and the office of the Secretary of War, and the acts and things hereinafter complained of, constituting as they do an interference with interstate commerce by affecting the navigability of the said Connecticut River, necessitates that permission should be obtained from the War Department and the office of the Secretary of War of the United States before any of the acts and things hereinafter complained of can be lawfully done by the Commonwealth of Massachusetts, which permission has not been obtained."

The Respondent, the Commonwealth of Massachusetts, in its answer filed in this Court makes the following claims:

"5. Answering the fifth paragraph, set forth on pages three and four, of the printed bill of complaint, the defendant admits that the United States of America, acting under the authority of the Constitution of the United States, by virtue of various acts of the Congress of the United States, has assumed the care and control of navigable rivers and has placed the greater portion of the duty of exercising such control in the War Department of the United States Government and the office of the Secretary of War; that the defendant denies that any acts and things which have been in fact done or which are in fact planned by the Commonwealth of Massachusetts, complained of in said bill of complaint, constitute in any way an interference with interstate commerce by affecting the navigability of the said Connecticut River, or that, in so far as concerns any rights or interests of the State of Connecticut or of the people thereof, there is any necessity that permission should be obtained from the War Department and the office of the

Secretary of War of the United States before any of the acts and things heretofore actually done or hereafter actually contemplated to be done by the Commonwealth of Massachusetts, referred to in said bill of Complaint, may be lawfully done by the Commonwealth of Massachusetts, but the defendant says that whether or not such permit is necessary rests solely within the jurisdiction of Congress and of the War Department, in so far as the powers of Congress have been delegated to that department. The defendant admits that at the time of the preparation of this answer permission from the War Department or from the office of the Secretary of War of the United States had not been obtained to do any acts actually done or contemplated to be done by the Commonwealth of Massachusetts, referred to in the bill of complaint, for which any permit may be by law required, but the defendant avers that it has filed with the Secretary of War applications for permits to make certain diversions of the waters of the Swift River and of the Ware River, which contemplated diversions are hereinafter more fully described. The defendant denies that any diversion of the waters of any other river in the watershed of the Connecticut River is contemplated or planned by it. The defendant denies each and every other material allegation of fact in said fifth paragraph of the bill of complaint, if any such there be." (Answer of Mass. pp. 5-7.)

11. Answering the eleventh paragraph, set forth on page six of the printed bill of complaint, the defendant says that it is ignorant as to whether the State of Connecticut is the owner of the bed of the Connecticut River within the territorial limits of the State of Con-

necticut and leaves the complainant to prove the same in so far as it be material; and further answering, the defendant avers that no question of whether any act done or contemplated to be done by the Commonwealth of Massachusetts had an adverse or injurious effect upon the navigability of the Connecticut River is here relevant or material, the determination of such issues having been committed by the Constitution of the United States to Congress, which has delegated its administrative powers to the War Department and the Secretary of War. Each and every other material allegation of fact, if any such there be, contained in the eleventh paragraph of the bill of complaint is denied by the defendant. (Answer of Mass. p. 10).

Fifth. That the allegations contained in the bill of complaint in many and divers places, with respect to any interference which may be caused by the said diversion with the navigability of the Connecticut River are in nowise material, relevant, and pertinent to this bill, inasmuch as exclusive control of navigable waters and regulation of obstructions and diminutions of navigable streams has been committed by the Constitution of the United States to the Congress of the United States, which in turn, has delegated under general rules administrative power over the said waters to the Secretary of War and the Department of War. (Answer of Mass. p. 30).

3. Under date of November 30th application for permits, prepared by David B. Keniston, Chairman of the Metropolitan District Water Supply Commission, presumably acting under authority given him by the Commission, were filed with the Secretary of War — said applications were as follows:

" U. S. Engineer Office
Providence, R. I.
Dec. 1-1927
Conn 54/157

U. S. Engineer Office
Division Engineer
N. E. Division,
New York

David B. Keniston,
Chairman
Charles M. Davenport
Joseph H. Soliday
Commissioners
Frank E. Winsor
Chief Engineer

COMMONWEALTH OF
MASSACHUSETTS
Conn 19/32
Metropolitan District
Water Supply Commission
24 School Street, Boston

Subject: WARE RIVER DIVERSION

War Department
United States Engineer Office
13th Floor, Custom House
Boston, Mass.

November 30, 1927
Office Chief of Engineers
Dec. 6-1927
7510 (Mass. Metro. Dist.
Water Supply Com'n. 1
Subs 1-4

Gentlemen:

The letter from your department, signed by S. A. Cheney, Colonel, Corps of Engineers, District Engineers, dated November 22, 1927, directed to this Commission in reference to the contemplated diversion of the waters of the Swift and Ware Rivers for the purpose of procuring an additional water supply for the Metropolitan District received.

The diversion of waters referred to is of the Ware River authorized by Chapter 375 of the Acts of 1926 (Massachusetts) and of the Swift River authorized by Chapter 321 of the Acts of 1927 (Massachusetts), both rivers being entirely within the State of Massachusetts and being non-navigable. Copies of both of these Acts are attached hereto.

In accordance with the letter from your department and as suggested by Colonel Cheney in a recent conference, this Commission hereby makes formal application for a permit for the diversion of the waters of the Ware River in accordance with the terms of Chapter 375 of the Acts of 1926 which provides so far as said diversion is concerned as follows:

'Section 1, Paragraph 2 — The commission on behalf of the commonwealth, shall forthwith for the purpose of extending and increasing the water supply of the Metropolitan water system, and of such cities and towns not members of the metropolitan water district as may hereafter require water from said system, divert into the Wachusett reservoir of said district the flood waters, as defined in section four, of the Ware River at a point in the town of Oakham or the town of Barre not more than one mile from the bridge of the Boston and Albany railroad crossing said river in the village of Coldbrook, and construct as a part of the metropolitan water system, such works as may be necessary for such extension and increase, and all structures and appurtenances incidental or complementary thereto; provided, that said flood waters shall not be so diverted between May thirty-first and December first in any year unless such diversion be first approved by the state department of public health.

'Section 4, Paragraph 1 — For the purpose of this act, the flood waters of the said Ware River which the commission is authorized to divert as provided in section one are hereby defined to be the waters thereof at and above the point of diversion established under section one in excess of a flow of eighty-

five million gallons a day, meaning thereby that on any day when the natural flow of said river is less than eight-five million gallons no water shall be diverted.'

"This matter was taken up by Mr. Winsor, Chief Engineer of this Commission, with Major Fowler of the Providence Office early in the year, and it was our impression that if anything further was required on the part of the War Department, we would be notified. Work has been going on since that time and in view of the immediate necessity of the Boston Metropolitan District for an additional water supply, and the serious danger of a water shortage unless this work is prosecuted to the earliest possible completion, we cannot too strongly urge that a permit be immediately granted.

Respectfully,

Metropolitan District Water Supply Commission

By: Davis B. Keniston (Sgd.)

Chairman

Incls.

DBK:CH"

Davis B. Keniston,
Chairman,
Charles M. Davenport,
Joseph H. Soliday,
Commissioners
Frank E. Winsor,
Chief Engineer

THE COMMONWEALTH OF MASSACHUSETTS
Metropolitan District
Water Supply Commission,
24 School St., Boston,
Nov. 30th, 1927.

SUBJECT — SWIFT RIVER DIVERSION

War Department,
United States Engineer Office,
13th Floor — Custom House,
Boston, Mass.

Gentlemen: —

The letter from your department signed by S. A. Cheney, Colonel, Corps of Engineers, District Engineer, dated November 22, 1927, directed to this Commission in reference to the contemplated diversion of the waters of the Swift and Ware Rivers for the purpose of procuring an additional water supply for the Metropolitan District received.

The diversion of waters referred to is of the Ware River authorized by Chapter 375 of the Acts of 1926 (Massachusetts) and of the Swift River authorized by Chapter 321 of the Acts of 1927 (Massachusetts), both rivers being entirely within the State of Massachusetts and being non-navigable. Copies of both of these Acts are attached hereto.

In accordance with the letter from your department and as suggested by Colonel Cheney in a recent conference, this Commission hereby makes formal application for a permit for the diversion of the waters of the Swift River in accordance with the terms of Chapter 321 of the Acts of 1927 which provides so far as said diversion is concerned as follows:

Section 1, 1st Paragraph — "The metropolitan district water supply commission, established by chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six, hereinafter referred to as the commission, on behalf of the commonwealth, shall forthwith, for the purpose of adding to, extending and further developing the additional sources of water supply of the metropolitan water system provided for in said chapter three hundred and seventy-

five, divert into the Wachusett reservoir of the metropolitan water system the waters of the Swift River, and of Beaver Brook a tributary of the Ware River, by the construction of an extension, to the Swift river, of the aqueduct or tunnel between the Wachusett reservoir and the Ware river at or near Coldbrook provided for in said chapter three hundred and seventy-five, and by the construction of a temporary diversion dam as may be required at a point on the Swift river below the confluence of the east and middle branches or at a point on the east branch near the village of Greenwich, and ultimately by the construction of a dam across the Swift river at or near the boundary line between the towns of Ware and Enfield, and of a dam across Beaver Brook at or near said boundary line, thereby creating a storage reservoir in the Swift river valley. No water shall be diverted or stored in any calendar day when the flow of the Swift river at or just above the village of Bondsville in the towns of Palmer and Belchertown is less than twenty million gallons; and there shall be discharged from any storage created by the commission above said village a sufficient amount of water to maintain, so far as such storage will allow, a flow of said river at said village of not less than twenty million gallons in each calendar day."

This matter was taken up by Mr. Winsor, Chief Engineer of this Commission, with Major Fowler of the Providence office early in the year, and it was our impression that if anything further was required on the part of the War Department, we would be notified. Work has been going on since that time and in view

of the immediate necessity of the Boston Metropolitan District for an additional water supply, and the serious danger of a water shortage unless this work is prosecuted to the earliest possible completion, we cannot too strongly urge that a permit be immediately granted.

Respectfully,

Metropolitan District Water Supply Commission
(By) (Sgd) Davis B. Keniston, Chairman.

These communications were intended by said Metropolitan District Water Supply Commission as applications for permits to divert the waters of the Swift and Ware Rivers in such a manner as would take said waters entirely away from navigation and forever remove such diverted water from the watershed of the Connecticut River and would use said water so diverted for the purposes other than in aid of navigation, and entirely remove said water as a future aid to maintain the navigability of said Connecticut River or increase it to its navigable capacity.

4. Said documents, or requests for permits hereinbefore recited were not accompanied by any plan or plans or specifications or explanatory drawings, charts or other descriptive data whatsoever.

5. Representatives of the State of Connecticut, learning that these applications for permits had been filed, requested an opportunity to be heard and to be given an opportunity to inspect the plans, designs or specifications, which under the law should have been filed for approval or disapproval of the Secretary of War and such applications and requests have been made to the Secretary of War in person and to the Chief of Engineers and various officers serving under them who have

been placed in charge of this investigation with the direction to make recommendations upon which the Chief of Engineers and the Secretary of War will predicate their official action.

6. The Secretary of War and the Chief of Engineers and their assistants have taken the position that it is not necessary that this applicant in applying for a permit to carry on the work and make the taking and diversion contemplated in this case, should file any plans or speculations to be examined and recommended by the Chief of Engineers and approved by the Secretary of War, and the Secretary of War and his subordinates have proceeded to make an investigation, in the course of which it has become apparent and has been proved to the Secretary of War and the Chief of Engineers that the applicant intends to take and will take a large quantity of water, which will be entirely diverted and removed from navigation and which removal effects the navigable capacity of the Connecticut River by taking said water out of the watershed of the Connecticut River.

7. The metropolitan District Water Supply Commission, acting for and in behalf of the Commonwealth of Massachusetts was created by Acts of the General Court of the Commonwealth of Massachusetts and its duties are defined and set forth in the act creating it, copies of which Acts are hereto attached and marked Exhibit "A" and "B" and by reference made a part of this paragraph. These acts have not been amended so as to enable the said Commission to do any acts or things in any manner other than that set forth and described in said Acts hereinbefore referred to.

8. While said applications for permits hereinbefore set forth were pending before the Secretary of War for action, representatives of the State of Connecticut informed the Secretary of War and the Chief of Engineers that the request for

the permission to divert waters of the Swift and Ware Rivers involved a diversion of the waters of both rivers and notwithstanding the fact that the requests for permits, asked for authority to divert water from both the Swift and Ware Rivers, the Secretary of War and the Chief of Engineers saw fit to separate the Swift River diversion project from the Ware River diversion project and to act upon each separately. Separate action on each of said rivers was not originally intended by the Metropolitan District Water Supply Commission, but was suggested by the representatives of the Secretary of War and the Chief of Engineers and discussion of the diversion of waters from both rivers as one project was refused and they claimed the right to hear evidence and to decide each question separately.

9. All of the evidence and information introduced by the representatives of the Commonwealth of Massachusetts or the representatives of the State of Connecticut and all the investigations conducted by the Secretary of War and the Chief of Engineers showed conclusively that the Respondent, the Commonwealth of Massachusetts, intended to erect obstructions in the Ware River and the Swift River and to divert water from each of said rivers, which water, except for such diversion and permanent taking away, as planned by the Commonwealth of Massachusetts, would naturally flow into the Connecticut River and affect the navigable capacity of said Connecticut River.

10. All of the evidence and information obtained by the Chief of Engineers and the Secretary of War showed that the waters of the Ware River and the Swift River naturally and in the regular course of nature flowed into the Connecticut River, which is a navigable river and the waters of the Ware River and the Swift River so flowing into a navigable river as aforesaid was and is navigable water of the United States and

contributes to the navigable capacity of the said Connecticut River and Congress has not consented to the building of a dam, canal or obstruction in said navigable water of either the Ware River or the Swift River and no plans for the structure have been submitted to the Chief of Engineers or the Secretary of War for approval.

11. All of the evidence and information obtained by the Secretary of War and the Chief of Engineers showed conclusively that no plans had been recommended by the Chief of Engineers or authorized by the Secretary of War for the placing of an obstruction to the navigable capacity of the Connecticut River by interfering with the flow of the tributaries of the Connecticut River, to wit, the Ware River and the Swift River, and all of the evidence and information obtained by or presented to the Secretary of War or the Chief of Engineers showed conclusively that the work contemplated by the Commonwealth of Massachusetts and its servants and agents in diverting and entirely taking away waters of the Ware River and the Swift River from the Connecticut River and the watershed of the Connecticut River and removing and transporting said waters entirely out of said watershed and into another watershed to be used for domestic purposes has no real or substantial relation to the control of navigation and has no appropriateness to that end, and the diversion is contemplated for sanitation and development purposes only, and to permit such diversion or acquiesce therein is outside the power or authority confided by Congress to the Secretary of War.

12. Notwithstanding that the plain and uncontroverted facts all show this diversion to be affectual removal and taking of water which in its usual and natural course flows into a navigable stream and affects and influences the navigable capac-

ity of said stream, if permitted would remove said navigable water entirely from navigation in such a manner as to effectually prevent it from ever again being used in navigation or becoming navigable water or aiding and assisting or developing or affecting the navigable capacity of said Connecticut River and that the duty of the Secretary of War and the Chief of Engineers in the premises was to exercise the functions and power confided by Congress to prevent injury to the navigability of the Connecticut River or to the navigable capacity of said river or to prevent the obstruction or taking away, diverting or removing navigable waters from its use in navigation, the Secretary of War and the Chief of Engineers caused to be entered upon the recommendations in the office of the Secretary of War and the Chief of Engineers the following endorsements:

"7510 (Mass. Dist. Water
Supply Comn.)-1

Subject — Application for permission to divert water from Ware River, Massachusetts.

6th Ind.

Office C. of E. March 6, 1928. TO THE SECRETARY OF WAR:

1. The Metropolitan District Water Supply Commission of the State of Massachusets has made application for permits to divert excess waters from Ware River and the major part of the flow of the Swift River for an additional water supply for the Boston Metropolitan District. The particular application under consideration in this endorsement refers to the excess waters of the Ware River.

* * * * *

9. The applicant is very desirous of a decision concerning the Ware River application as soon as possible. So far as the interests committed to this department are concerned, I see no reason for deferring action in the case. In my opinion the proposed diversion of waters in excess of 85,000,000 gallons per day (131 cubic feet) will have no adverse affect on the Navigable Capacity of the Connecticut River. In view of the controversy before the Supreme Court, it seems inadvisable to issue a formal permit for the present, but to inform the applicant that no objection will be interposed by the War Department to the diversion of the flood waters exceeding 85,000,000 gallons per day for the period October 16th to June 15th of each year. Approval of this course of action is recommended.

(Sgd.) Edgar Jadwin,
Major-General
Chief of Engineers.

Approved March 14, 1928, with the understanding this present action will not affect the consideration of the Swift River application.

(Sgd.) Dwight F. Davis,
Secretary of War.

And thereafter a communication, of which the following is a copy, was submitted to and received by the Metropolitan District Water Supply Commission:

War Department
United States Engineer Office
Providence, R. I.

Refer to file No. Comm. 64/1-104 March 19, 1928.

Metropolitan District Water Supply Commission,
The Commonwealth of Massachusetts
24 School Street
Boston, Massachusetts

Gentlemen:

Referring to your application of November 30, 1927, for federal authority for the diversion of the flood waters of the Ware River for an additional water supply for the Boston Metropolitan District, this office has been directed by the Chief of Engineers to inform you that no objection will be interposed by the War Department to the diversion of the flood waters of the Ware River exceeding 85,000,000 gallons per day for the period October 16 to June 15 each year.

For and in the absence of Colonel S. A. Cheney, Corps of Engineers, District Engineer.

Very respectfully,
Thos. R. McElroe (Sgd.)
Chief Clerk.

The action taken by Chief of Engineers and Secretary of War in the case of the application for a permit to divert waters of the Ware River was claimed by them to be based solely upon the provisions of section 10 of the Rivers and Harbors act approved March 3rd, 1899. Under said section there was no power or authority in either the Chief of Engineers or Secretary of War to take the action herein set forth upon said

application, their authority being expressly confined, under said section, to a recommendation of proposed work for the Chief of Engineers and the authorization of such work by the Secretary of War.

14. Said Metropolitan District Water Supply Commission acting for and in behalf of the Commonwealth of Massachusetts consider said action by the Chief of Engineers and the Secretary of War as an authorization for the diversion of the water of the Ware River as requested in their application dated November 30, 1927, and acting under said authority of the Chief of Engineers and Secretary of War said Metropolitan District Water Supply Commission acting on behalf of the Commonwealth of Massachusetts has entered into a number of contracts amounting to many thousands of dollars for the construction of tunnels and aqueducts, all of which are a part of the general plan of the Commonwealth of Massachusetts to provide for the diversion of the waters of the Ware and Swift Rivers, all of which facts were known to the Chief of Engineers and the Secretary of War and were presented to said officers as a reason why action by the Chief of Engineers and Secretary of War was desired by the Commonwealth of Massachusetts.

15. Whereas, under the law, the facts having showed that this contemplated diversion was not in aid of navigation and was not intended for the protection or improvement of navigation, but in so far as it had any effect on navigation it tended to destroy and create obstructions to the navigable capacity of the Connecticut River and that this work was the creation of obstructions to navigable capacity erected or constructed in navigable waters of the United States, which was prohibited unless affirmatively authorized by Congress, as ap-

pears by Sections 9 and 10 of the Rivers and Harbors Act approved March 3, 1899 (a copy of which is attached and marked Exhibit "C"), the Secretary of War and the Chief of Engineers by their action and the action of their subordinates under their direction and control are encouraging and abetting the Commonwealth of Massachusetts and the Metropolitan District Water Supply Commission as the servants and agents of the Commonwealth of Massachusetts to proceed with the proposed construction in navigable waters in violation of the acts of Congress in such case made and provided and to erect and construct obstructions to the navigable capacity of the waters of the United States to wit: The Connecticut River, and to divert waters from their natural and usual course and into another and entirely different watershed and thereby take navigable water away from and out of a navigable river, affecting the navigable capacity of said Connecticut River, and the Secretary of War and the Chief of Engineers went beyond performance of any duty imposed upon them by the act of Congress and there is no warrant in law and no authority given to the Secretary of War or the Chief of Engineers to send or cause to be sent a communication such as is hereinbefore recited.

16. All of the evidence introduced and all of the facts ascertained by the Secretary of War and the Chief of Engineers showed conclusively that the contemplated construction was an obstruction to the navigable capacity of the Connecticut River, which is directly prohibited and forbidden by the Acts of Congress and the Secretary of War and the Chief of Engineers have no power or authority to recommend or approve the removal or taking of navigable water from its natural watershed and permitting said water to be conveyed away and into another and entirely different watershed to be used for

purpose other than navigation; and it is the duty of the Chief of Engineers and the Secretary of War to disapprove any and all plans for such taking and removal and to exercise due diligence to prevent such taking and removing. All of which said Secretary of War and the said Chief of Engineers have neglected and refused to do and on the contrary, by their unwarranted and unprecedented procedure in sending a letter, signed by the Chief Clerk, have attempted a round-about approval of said taking and diversion by stating the Department had "no objection".

17. All of the evidence submitted to and investigations conducted by the Secretary of War and the Chief of Engineers show conclusively that the navigable capacity of the Connecticut River can be materially increased by storing and holding back flood waters to be later released and in this manner maintain a continuous and regular flow in the Connecticut River, which flow will be of such depth as to materially aid navigation on said river and various governmental agencies have considered plans for the enlargement of the navigable capacity of said Connecticut River, and the action of the Secretary of War and the Chief of Engineers in permitting or condoning the submitting of a letter from the Chief Clerk connected with the War Department, stating that "no objection" will be interposed to the taking and carrying away of a large quantity of water which ordinarily would aid and enlarge the navigable capacity of the Connecticut River is contrary to law and unwarranted.

18. All of the evidence submitted to and investigation conducted by the Secretary of War has shown conclusively that there is no record or knowledge on the part of any persons of the Ware River ever having overflowed the natural banks of the stream and furthermore waters of the said Ware

River flow continuously into the Connecticut River and, as such tributary of the Connecticut River, is navigable water. The Secretary of War and the Chief of Engineers are without any reasonable basis or fact for either assuming or stating that there is "flood water", so-called, which can be diverted.

19. All of the evidence submitted to and investigation conducted by the Chief of Engineers and the Secretary of War shows that the promotion of navigation and the safeguarding of the navigable capacity of the Connecticut River will require the reinforcement of the flow of the stream during the dry season and it is the duty of the Secretary of War to prevent the taking or removal of any water from the watershed of the Connecticut River when it is the common and accepted knowledge of all parties interested that the use of said water in the Connecticut River will aid navigation and preserve the navigable capacity of said Connecticut River.

20. Prior to the adoption of the Constitution of the United States both the State of Connecticut and the Commonwealth of Massachusetts were possessed of a prerogative title to the bed and banks of the Connecticut River and all other navigable streams within their territorial limits. This title carried with it, as incident thereto, a prerogative right in the use of all the water flowing in such navigable streams for public purposes which include navigation and fishing. There was no proprietary interest or title in either of these two states, such title being in the riparian owners along said navigable stream and said proprietary title of the riparian owners carrying with them the use of the waters of the stream for all purposes other than, and only subject to, the right of navigation and fishing in navigable streams by the general public.

21. This title held by the State of Connecticut and the

Commonwealth of Massachusetts vested in these sovereignties a title in trust for all the people of these two states to use all of the water which flowed in its navigable streams for navigation purposes and each of said states was legally bound as trustee to protect and preserve all of the water in these streams for the purposes of navigation to its fullest extent by all of the people of said states.

22. Each of said states also possessed the power and authority to regulate and control all interstate commerce and foreign commerce, having occasion to use the waters of its navigable streams. This power and authority was the only power which was delegated by the State of Connecticut and the Commonwealth of Massachusetts to the United States when its Constitution was adopted.

23. Under this delegation of authority the United States succeeded to the trusteeship in the use of all waters flowing in navigable streams of these states, which were susceptible of being used for the purposes of interstate and foreign commerce. No title was passed to the United States of either the bed or banks of these navigable streams and the only power which was delegated to the United States was the use of these waters in trust for the general public for the purpose of aiding interstate and foreign commerce, maintaining navigation as afforded by nature, and improving navigation by such possible means as from time to time became feasible to insure the maximum use of such waters for commercial purposes.

24. In assuming such trusteeship, the United States as well as the State of Connecticut and the Commonwealth of Massachusetts were charged by all the rules of law, equity and conscience to protect and preserve the trust estate and insure the use of such trust property only for the benefit of the benefi-

ciaries of the trust and only for the purpose for which the trust was created.

25. As such trustee, the United States has no power to authorize or permit the use of any of the navigable waters of the United States or any waters which find their way to and become a part of a commercial waterway of the United States, to be diverted from such navigable stream and taken away from the watershed of such navigable stream and used for a purpose which is neither an aid to navigation nor in any way connected with a navigable purpose.

26. The United States, as such trustee, is charged with the duty of preserving and protecting all of the waters which contribute to the navigable capacity of a navigable stream and when it appears to said trustee that it is proposed to divert any of said water to a point without the watershed of such navigable streams and for a purpose not connected with navigation or when it finds that any such action is threatened, it is the duty of the United States, through its officers and servants, to prevent such diversion and to take all possible measures necessary to prevent the depletion of the trust estate.

27. It is the further duty of the United States, as such trustee, to protect the proprietary rights of riparian owners along the navigable streams by preserving for their use all of the waters flowing into navigable streams so long as their use does not interfere with the navigability or navigable capacity of such streams.

28. The United States has placed in the hands of the Secretary of War and the Chief of Engineers the administrative duty of executing the trust imposed upon the United States to preserve and protect navigation so far as its needs for interstate and foreign commerce are concerned and to prevent the interference with the use of such waters by the states in intra-

state navigation and the use of such waters by the riparian owners in their use of such waters subject only to the interest and needs of interstate and foreign commerce.

29. As hereinbefore alleged, it has not only come to the attention of those administrative officers that the waters of a navigable stream, the Connecticut River, were proposed to be diverted from the watershed of the Connecticut River into an entirely different watershed; that it is proposed to use such waters for no navigable purpose nor for any purpose connected with navigation; but said officers have been directly asked for a permit to accomplish such purposes, which if permitted or allowed will violate the trust heretofore alleged.

30. It is the duty of said administrative officers to refuse to grant such permit and it is their further duty to notify said applicant that all steps possible will be taken to prevent the impairment of the trust estate and prevent the diversion of any water from the watershed of the Connecticut River to any other watershed for a non-navigable purpose or any purpose not connected in any way with navigation.

31. The Secretary of War and the Chief of Engineers have already, by their action in connection with a diversion of waters from the Ware River, notified the Commonwealth of Massachusetts that, while the United States will not affirmatively permit the impairment of this trust estate and the diversion of these waters for a non-navigable purpose, the United States will make no objection to the impairment of the trust estate and will take no measures to prevent the diversion of these waters.

32. It is the immediate purpose of the Secretary of War and the Chief of Engineers to notify the Commonwealth of Massachusetts that the same procedure will apply in the case of the Swift River, and the trust estate will be further impaired

without objection by the trustee and a diversion of navigable water allowed for a non-navigable purpose.

33. The State of Connecticut presented all of the claims of law, included in this Motion, before the Secretary of War and the Chief of Engineers at the time the application for a diversion of the waters of the Ware River was before them for official action and all of said objections and claims of law have been renewed before them in the pending application for a diversion of the waters of the Swift River — all of such claims were overruled by the Chief of Engineers and the Secretary of War in the Ware River case and will be over-ruled in the Swift River matter unless the intervention of this Court is permitted to restrain them from further action. The State of Connecticut has requested the Chief of Engineers and Secretary of War to reconsider and reopen the ruling heretofore made upon the application for the diversion of waters from the Ware River and to deny said application and said request has been rejected.

34. The State of Connecticut, as the owner of the bed and banks to high-water mark of the Connecticut River and as trustee for the people of Connecticut to maintain and preserve all of the water flowing into said navigable stream for navigation purposes and the improvement of navigation to the extent of the navigable capacity of the stream and watershed, is chargeable with the duty of maintaining the navigable capacity of the Connecticut River intact and in the performance of that duty, now requests that action by the Secretary of War and the Chief of Engineers as the administrators of the trust delegated to the United States be prevented from taking any action which in any manner encourages, permits or allows the diversion of any of the waters of the Connecticut River watershed

for non-navigable purposes and to further prevent them from notifying the Commonwealth of Massachusetts that they will not object to nor take any action to prevent the diversion taking place.

35. The State of Connecticut, under its Constitution, being charged with the obligation of enforcing and protecting the proprietary vested rights of the riparian owners along the Connecticut River in their use of the water for all purposes, subject only to rights of navigation, is also charged with the duty of preventing the agents and servants of the United States from permitting or allowing, directly or indirectly, a diversion of any of the waters of the Connecticut River watershed for any purpose other than as an aid to and improvement of navigation.

In consideration whereof, and for as much as your orator and its citizens and residents who except by representation by your orator have no remedy and can only have adequate relief in this honorable court, your orator on its own behalf and also as parens patriae, trustee, guardian and representative of that great proportion of its citizens, who are directly affected by the acts of the defendant hereinbefore set forth, prays this honorable court to take cognizance of the general charges set forth in the premises.

WHEREAS you orator needing relief prays:

1. That the said, the Secretary of War and the Chief of Engineers, their servants and agents and each and every of them may be made parties respondent to the bill of complaint, as filed in this action and that they and each of them may be compelled to answer each and every allegation therein contained and contained in this Motion, but not under oath, the answer under oath being expressly waived.

2. That it be adjudged and decreed that neither your orator nor any of its citizens and residents have an adequate remedy at law for the injury which will result from the enforcement of said acts and that such injury would be irreparable.

3. That the said, the Secretary of War and the Chief of Engineers, their officers, agents and servants and each of them may be restrained from committing any of the acts and deeds herein complained of and from any violation of the rights of your orator or of its citizens and residents in the premises by a writ of injunction, issuing out of and under the seal of this honorable court, perpetually enjoining and restraining the said respondents, their respective officers, agents and servants from in any way interfering with the natural and customary flow of the waters of the Connecticut River or of any tributaries thereof and particularly from allowing and permitting, directly or indirectly, the diversion of any of the waters of said Connecticut River or of any of its tributaries, including the Ware River and the Swift River and from notifying the commonwealth of Massachusetts or any of its servants or agents that the United States, the War Department, the Secretary of War and the Chief of Engineers or any of their servants or agents, will interpose no objection to any proposed diversion of any of said waters, or that a diversion of said waters will not be prevented by the United States, the Secretary of War, the Chief of Engineers or any of their servants or agents, or taking any action upon the application for the diversion of the Swift River except to deny the same, and by way of affirmative relief that the Secretary of War, the Chief of Engineers, their officers, servants and agents be ordered to revoke and withdraw the recommendation and approval upon the application to divert the waters of the Ware River and to deny said application.

4. That this honorable court may grant your orator such other and further relief as the equity of the case may require whether specifically prayed for herein or not, and which to your honorable court may seem just and proper in the premises.

5. That it may please your honorable court to grant unto your orator not only a writ or injunction conformable to the prayers of this bill, but also that a writ of subpoena of the United States of America be issued out of and under the seal of this court directed to the Secretary of War, the Chief of Engineers of the U. S. Army, their officers, servants and agents, commanding said respondents on a certain day to be named therein, to be and appear before this honorable court then and there to answer, but not under oath, answer under oath being waived, all and singular the premises, and to stand to, perform, and abide such order, direction and decree as may be against said respondents in the premises and as may be required by the principles of law, equity and good conscience.

THE STATE OF CONNECTICUT,

By Benjamin W. Alling,

Its Attorney General.

And your orator will ever pray.

Ernest L. Averill,

Deputy Attorney General

Benedict M. Holden,

of Counsel.

EXHIBIT "A"

Acts of 1926, Chapter 375.

AN ACT MAKING ADDITIONAL PROVISION FOR THE WATER SUPPLY NEEDS OF THE METROPOLITAN WATER DISTRICT AND OTHER COMMUNITIES WHICH NOW OR HEREAFTER MAY REQUIRE WATER THEREFROM, AND OF THE CITY OF WORCESTER.

Whereas, The deferred operation of this act would, in part, defeat its purpose, therefore it is hereby declared to be an emergency law necessary for the immediate preservation of the public convenience.

Be it enacted, etc., as follows:

Section 1. A special metropolitan district water supply commission is hereby established, consisting of the commissioner of the metropolitan district commission as chairman and of two associate commissioners to be appointed by the governor with the advice and consent of the council, said commission to be hereinafter referred to as the commission. The associate commissioners shall serve for terms of five years, or until their successors are appointed and qualified. The governor may with like advice and consent remove any associate commissioner and fill for any unexpired term vacancies which may occur in the associate commissionerships. The chairman shall receive in addition to his salary as commissioner of the metropolitan district commission the sum of twenty-five hundred dollars a year, and the associate commissioners shall each

receive a salary of four thousand dollars a year. The commission may hire such offices and other quarters as may be needed for the conduct of its work. The commission may appoint a chief engineer, and with the advice and consent of the governor and council may fix his salary.

The commission, on behalf of the commonwealth, shall forthwith for the purpose of extending and increasing the water supply of the metropolitan water system, and of such cities and towns not members of the metropolitan water district as may hereafter require water from said system, divert into the Wachusett reservoir of said district the flood waters, as defined in section four, of the Ware river at a point in the town of Oakham or the town of Barre not more than one mile from the bridge of the Boston and Albany railroad crossing said river in the village of Coldbrook, and construct as a part of the metropolitan water system, such works as may be necessary for such extension and increase, and ill structures and appurtenances incidental or complementary thereto; provided, that said flood waters shall not be so diverted between May thirty-first and December first in any year unless such diversion be first approved by the state department of public health. Said works, and particularly the aqueduct or tunnel required for said diversion, shall be constructed at such grade and of such capacity and otherwise so that they can be used as a part of works that shall later be constructed for diverting into the Wachusett reservoir the waters of the Swift river, in substantial accordance with the plans and recommendations of the joint board on water supply needs and resources of the commonwealth as contained in its report to the general court in the year nineteen hundred and twenty-two, printed as house document number fifteen hundred and fifty of said year. All plans, maps and records of said joint board relating to the proposed extension to

the Ware, Swift and Millers rivers shall be made available to the commission, and the department of public health shall, at the expense of the commission, furnish it, on request, with any information relative to said projects that said department may have in its possession. In constructing the works herein authorized, the commission may adopt such emergency methods as in its opinion may be necessary or desirable to secure their completion as soon as the public necessity may require.

Said aqueduct or tunnel upon completion to said point of diversion and the diverting dam and other works and property incidental thereto, when completed shall be turned over to the metropolitan district commission, and shall be thereafter maintained by said commission as a part of the metropolitan water system under chapter ninety-two of the General Laws with all the powers and duties conferred by said chapter.

The commission established hereby shall annually, on or before January fifteenth, make a report, in conformity with the provisions of section thirty-two of chapter thirty of the General Laws, for the fiscal year ending on the thirtieth of November preceding, and said report shall be printed as a public document under section six of chapter five of the General Laws.

Sec. 2. In contracts entered into by the commission for the construction of the works herein authorized, there may be inserted a provision that the commission or any contractor or sub-contractor for the commission may employ laborers, workmen and mechanics for more than eight hours in any one day and for more than forty-eight hours in any one week in such construction, when, in the opinion of the commissioner of labor and industries, public necessity so requires. The commission may appoint and in its discretion remove such engineering, legal, clerical and other assistants as it may deem necessary to

carry on the work herein authorized, and may fix their compensation in accordance with such rules and regulations as the commission may establish and as shall be aproved by the governor and council. Such appointments shall not be subject to classification under sections forty-five to fifty, inclusive, of chapter thirty of the General Laws, and chapter thirty-one of the General Laws shall not apply to removals, and, in accordance with such regulations as the commission may establish and as shall be approved by the governor and council, any appointment, including that of the chief engineer, may be wholly exempt from said chapter thirty-one. Upon request of the commission, the division of civil service shall hold special examinations.

Sec. 3. For the purpose of providing for the future extension of the metropolitan water system, the commission, on behalf of the commonwealth, may take by purchase or otherwise such lands, water rights, easements and other property in the watershed of the Swift river as it may deem necessary or desirable in preparation for the development of this river as a potential water supply for future use. The commission shall submit to the general court not later than the first Wednesday of January, nineten hundred and twenty-seven, a draft of such legislation as it may deem necessary or advisable for the development of an adequate future water supply from the Swift river.

The commission shall also consider the recommendations of the metropolitan district commission relative to making available by filtration or chlorination, or both, the waters of the Sudbury and Cochituate watersheds as contained in house document number eleven hundred and ten of nineteen hundred and twenty-six and as referred to in the report of the metropolitan water supply investigating commission in house docu-

ment number nine hundred of nineteen hundred and twenty-six; shall consider the effect on the present water supply of the metropolitan district of the addition thereto of water purified by filtration or other means and the effect of such water upon the present aqueducts, reservoirs and other facilities of the metropolitan water district; and shall report in detail plans and specifications for such land takings and for the construction of such additional works in the town of Framingham, and of such covered reservoirs as it may recommend, and the estimated expense thereof. The commission shall also consider and report on the amount of water which should be required for reasons of health and sanitation to flow below dam number one on the Sudbury river notwithstanding any provision of chapter one hundred and seventy-seven of the acts of eighteen hundred and seventy-two, and on all matters set forth in house document number ten hundred and forty-eight of nineteen hundred and twenty-six and the petition accompanying the same, especially the present and future water supply needs and resources of the town of Framingham, and the terms and conditions upon which said town should be entitled to receive water from the water supply now owned by the metropolitan district. The commission shall also consider and report upon the effect of the diversion for water supply purposes of the waters of the South Sudbury river upon public health in the town of Ashland, and whether or not a system of sewage disposal should be provided in said town in the event of such diversion. The commission shall report to the general court its findings and recommendations relative to the questions outlined in this paragraph, together with drafts of such legislation as may be necessary to effect its recommendations, by filing the same with the clerk of the house of representatives not later than December first of the current year, and it shall

at the same time file a copy thereof with the budget commissioner.

Sec. 4. For the purposes of this act, the flood waters of the said Ware river which the commission is authorized to divert as provided in section one are hereby defined to be the waters thereof at and above the point of diversion established under section one in excess of a flow of eighty-five million gallons a day, meaning thereby that on any day when the natural flow of said river is less than eighty-five million gallons no water shall be diverted.

The commission shall establish and maintain proper gauging stations or such suitable regulating devices as may be convenient and practical to establish the aforesaid limit of diversion with reasonable accuracy. Copies of all records obtained at such stations or by such devices shall be open to inspection during reasonable office hours and information shall be furnished, from time to time whenever reasonably requested, to any person owning or operating any mill or manufacturing establishment below the point of diversion or taking, or to the mayor of any city or the chairman of the board of selectmen of any town bordering on said river.

The waters of said Ware river and its tributaries at or above the point of diversion established as aforesaid, other than those authorized to be taken by the provisions of this act, and other than those waters not so taken which are needed for the processes of industry or for reasons of public health, are within its contemplation to be, when and as hereafter authorized by the general court, available for the domestic and public water supply of the city of Worcester and of the towns within the watershed of said river and its tributaries.

Sec. 5. For any of the purposes of this act, the commission, on behalf of the commonwealth, may at any time and

from time to time take by eminent domain or acquire by purchase or otherwise the flood waters, as hereinbefore defined, of the Ware river and its tributaries, or any of said flood waters, at or above the point of diversion established under section one, and all water rights, water sources, lands, rights of way, easements and other interests in land, including any cemetery, that may be deemed by the commission to be necessary or desirable for any of said purposes, or for the further protection of the purity of the waters to be diverted under this act.

Any taking under this act may be in fee or otherwise, perpetual in duration or for a limited period of time, according as the commission shall determine and set forth in the order of taking.

All takings under this act and all proceedings in relation to or growing out of the same shall conform to the provisions of chapter seventy-nine of the General Laws, except in the following particulars:

(*a*) The commission need make no award of damages sustained by persons or corporations in their property by any such taking.

(*b*) The notice required by section eight of said chapter may be given at any time within one year after the recording of the order of taking as provided in section three of said chapter.

(*c*) Petitions for the assessment of damages under section fourteen of said chapter may be filed within two years after the recording of the order of taking provided for in said section three, but petitions for the assessment of damages for the taking of rights of diversion may be filed within two years after, and not before, the actual diversion. The last six lines of section sixteen of said chapter seventy-nine, beginning with the word

"but" in line three, shall have no application to takings under this act.

(*d*) For all property taken under this act, except rights of diversion, the right to damages shall vest upon the recording of the taking in the registry of deeds. For taking of rights of diversion the right to damages shall vest upon and not before the actual diversion of water.

The owner of any real estate, whether within or without the commonwealth, which is not taken but is injured by the taking of the waters of Ware river under authority of this act or by the construction of the works incidental thereto shall be entitled to damages therefor and may recover the same from the commonwealth as in the case of a taking in accordance with the provisions of this act.

Sec. 6. In carrying out the powers and duties conferred upon it by this act, the commission may construct and maintain buildings, machinery, roads, conduits and aqueducts; may lay and maintain pipes, drains and wires; may alter or change the grades or directions of any water course; may carry and conduct any aqueduct, conduit, pipe, drain or wire under or over any water course, or any railroad, street or other way, in such a manner as not unnecessarily to obstruct or impede travel thereon; may dig up any such road, street or way, and lay, maintain and repair aqueducts, conduits, pipes, wires and other works beneath the surface thereof, conforming to any reasonable regulations made by the mayor and aldermen of cities and the selectmen of towns, respectively, wherein such works are performed, and restoring, so far as practicable, any such road, street or way to as good order and condition as the same was in when such digging was commenced; the commission may enter upon and use the lands of others; may take down dams to such an extent as it may deem necessary for

prosecuting its works, and shall rebuild such dams whenever the necessity for keeping them down ceases; shall use such lands and do all work relating to such dams, in a reasonable manner with regard to the interests of the owners thereof, and, so far as practicable, shall heed all reasonable requests made by such owners; and in general may do any other act or thing necessary or proper for carrying out the powers and duties conferred upon it by this act.

The commission may raise or alter or discontinue parts of any railroad or public way, and, in case of a railroad, shall make such raisings or alterations of the railroad or construct upon existing or other locations parts of the railroad to take the place of the parts so discontinued, as and in such manner as shall be mutually agreed upon by the commission and the board of directors of the railroad company, and, if they cannot agree thereon, then as and in such manner as shall be determined on the application of either party in writing by the department of public utilities, which is hereby authorized and directed to adjudicate finally upon the same; and, if the commission shall be of the opinion that the making of any such change of grade, alteration or construction requires that lands or rights therein be taken therefor, the commission shall, on behalf of the commonwealth, take such lands or rights therein and convey the same to the railroad company, to be thereafter held and used as the board of directors of such company may determine, and the railroad company may, if it desires, locate its lines over any lands or rights therein so conveyed to it, and, when said new lines of railroad are completed, the railroad company may discontinue the operation of the portions of its existing lines for which the new lines are substituted, and may maintain and operate said new lines of railroad; and the commission shall make the raisings or alterations of public ways as aforesaid and

build in place of the parts of public ways discontinued as aforesaid such other reasonable and suitable ways, which shall thereafter be highways, as and in such manner as shall be mutually agreed upon by the commission and the county commissioners of the county in which the work is done, or, if they cannot agree thereon, then as and in such manner as shall be determined on the application of the commission in writing by the division of highways of the department of public works, which division is hereby authorized and direct to adjudicate finally upon the same.

The commission, in flooding or otherwise affecting any burial ground, shall conform to any reasonable requirements relating thereto of the board of health of the city or town in which the same is located.

The commission may make such surveys, borings and do such other preliminary work on private lands as the commission may determine to be necessary or desirable, doing as little damage as possible and paying for the same.

Sec. 7. The commission may sell at public or private sale, or exchange or lease any property, real or personal, or any easement or water right, whether taken by eminent domain or otherwise acquired, which in the opinion of the commission is no longer needed for the purposes of this act. Any sums of money so received shall be applied to reduce construction costs or to reduce the bonded indebtedness for the works. The commission may, by lease, license or contract, permit the construction and maintenance on or over any land or waters under its control of towers, poles, wires and other structures for the purpose of transmitting electric power. The commission may construct, maintain and operate such power plants and other structures as may in its opinion be necessary to utilize the fall of water created at any of the dams, channels, tunnels or other structures

under its control, for the production of power or electricity; may locate, construct and maintain lines for transmitting the same; and may sell or contract for the sale or use of any power or electricity so created, and any sums of money so received shall be applied to reduce the charges of maintenance of said works.

Sec. 8. For the purpose of carrying out the provisions of this act, the commission may expend such amounts, not exceeding in the aggregate fifteen million dollars, including the sum required to be paid by the city of Worcester under section twelve, as may, from time to time, be approved by the governor and council. To meet such expenditures, the state treasurer shall, from time to time, on the request of the commission and subject to such approval, issue bonds of the commonwealth to an amount not exceeding the sum of fourteen million dollars, which shall be designated on their face, Metropolitan Additional Water Loan, Act of 1926. Such bonds shall be issued as coupon or registered bonds, for such term of years as may be recommended by the governor, in accordance with section three of Article LXII of the amendments to the constitution, and shall bear interest at such rate as shall be fixed by the state treasurer, with the approval of the governor and council. The amounts necessary to meet interest and serial payment requirements on said bonds and the expenses of maintaining and operating the works to be constructed by the commission under this act, and such other expenses as may be authorized hereunder, shall be added to the annual assessments upon the cities and towns comprising the metropolitan water district and apportioned and collected as provided by section twenty-six of chapter ninety-two of the General Laws.

Sec. 9. The supreme judicial court or any justice thereof and the superior court or any justice thereof, during a sitting

of the court or in vacation, on the petition of the commission or of any city, town, corporation or person interested, or of the attorney of any such petitioner, shall have jurisdiction in equity or otherwise to enforce the provisions of this act and of any rule, regulation or order made under the authority of the same and to prevent any violation of said provisions, rules, regulations or orders; provided, however, that no suit in which the right of the commission to make any taking authorized by this act is questioned shall be brought except in the supreme judicial court for the county in which said taking has been made or is to be made, nor unless the said suit is brought within six months after the passage of this act.

Sec. 10. No person shall after the effective date of this act erect a dam for mill purposes across the Ware river or any of its tributaries above the point of diversion authorized by this act without the consent in writing of the commission, or, after said works have been turned over to the metropolitan district commission, of said metropolitan district commission. In granting its consent, either commission may impose such conditions as it may deem to be for the public interest. Any person owning a practicable mill site on said river or any of its tributaries who applies for such consent and is refused, or is granted consent subject to conditions, and who is damaged in his property by such refusal or by the imposition of such conditions, may recover from the commonwealth the damage so caused in the manner provided in section five.

Sec. 11. The towns of Hubbardston, Barre, Oakham, Hardwick, New Braintree, Palmer and Ware, or any of them, may take from the Ware river above the point of diversion established under section one so much of the water thereof as they, or any of them, have already been, or may hereafter be, authorized by the legislature to take for supplying their in-

habitants with water, and in case any of said towns shall hereafter on its application therefor be authorized to take such water it shall pay to the commonwealth, on behalf of the metropolitan district, a fair proportion of the cost incurred by the commonwealth for the acquisition under the provisions of this act of the waters of said river, or rights therein, and for the construction, maintenance and operation of such works and structures as are by this act provided for, including a fair proportion of the cost of maintaining the purity of said water, the said proportion to be determined by an engineer designated by the metropolitan district commission and by an engineer appointed by such applicant town, and, if they cannot agree, such proportion shall be determined by a master to be appointed by the supreme judicial court on the petition of the commonwealth or said applicant town, and the report of the master when affirmed by said court shall be final and conclusive on all parties.

Sec. 12. The city of Worcester is hereby authorized, for the purpose of meeting the requirements of said city for increasing its water supply and such requirements of adjacent and nearby towns now supplied or hereafter required to be supplied by said city, from time to time, to acquire by purchase or otherwise, or take by eminent domain in accordance with the procedure set forth in section five, and subject to the provisions thereof, and to hold and convey, directly or indirectly, into and through said city the waters of South Wachusett brook, so-called, and the waters of Quinapoxet river, so-called, in the the town of Holden, at or near an elevation of seven hundred and eight feet above mean sea level at Boston, at or above the outlet of Quinapoxet pond, including the waters in any ponds or reservoirs thereon and the waters flowing directly or indirectly into and from the same, and all springs

and tributaries thereto, and the water rights connected with the aforesaid waters and sources above the places of taking; and the said city may take existing reservoirs and ponds upon said streams and their tributaries above the points at which it is authorized as aforesaid to take the said waters, but the total supply herein authorized to be taken shall not exceed in any calendar year an average quantity of ten million gallons of water per diem, and the balance of the waters remaining, and also from time to time such part of the quantity of water herein authorized to be acquired and diverted as is not, in the opinion of the water commissioner of said city, needed for the supply of the water system of said city, shall be permitted to flow to the Wachusett reservoir of the metropolitan water system; provided, that if in the opinion of the metropolitan district commission, the needs of the metropolitan water system, pending the completion of the works necessary to divert the flood waters of the Ware river as authorized in section one, require that said amount herein authorized to be taken by the said city be reduced, the metropolitan district commission may, at any time and from time to time, reduce said amount to not less than an average quantity of five million gallons of water per diem. In case of such reduction the commonwealth on behalf of the metropolitan district shall pay the city of Worcester for the amount of water so withheld by such reduction at the rate of forty dollars per million gallons. The said city shall take such measures to protect and preserve the purity of the said waters and shall maintain such sanitary conditions relative thereto and in their respective watersheds as the state department of public health may require. Said city may by aqueduct or pipe line conduct the waters so taken into the city directly or through any reservoir and any aqueduct or pipe line belonging to said city and now existing. The said city may,

for the purposes aforesaid, construct, lay and maintain conduits, pipes, canals, water courses, dams, reservoirs and other works under or over lands, water courses, railroads, railways, public or private ways and along such ways, and may take by purchase or otherwise and hold in fee or otherwise any lands, dams or structures, easements or rights in land that may be deemed necessary for said purposes and for collecting, purifying, storing, discharging, conducting or distributing said waters or preserving the purity thereof. The water taken by said city under this section shall be measured in a manner approved by the metropolitan district commission which shall have at all reasonable times free access to any apparatus or device used for measuring the same and to the records thereof.

In addition to such payments and damages as said city may be required to make for any purchases or takings hereinbefore authorized, it shall pay into the state treasury on or before the first day of July, nineteen hundred and twenty-seven, the sum of one million dollars, and thereupon the metropolitan district commission, acting for the commonwealth, shall release and convey to said city all right and title to said waters, subject to the provisions of this act. The amount so paid into the state treasury shall be used toward defraying construction costs incurred by the commission under this act.

In consideration of the provisions of this section, it is within the contemplation of this act that no further claim be made by the city of Worcester to any further part of the watershed tributary to the Wachusett reservoir for water supply purposes.

Sec. 13. For the purpose of meeting expenditures required under the preceding section, the city of Worcester may borrow from time to time, within a period of eight years from the effective date of this act, such sums as may be necessary, not exceeding, in the aggregate two million five hundred thou-

sand dollars, and may issue bonds or notes therefor, which shall bear on their face the words, City of Worcester Water Loan, Act of 1926. Each authorized issue shall constitute a separate loan, and such loans shall be payable in not more than thirty years from their dates. Indebtedness incurred under this act shall be in excess of the statutory limit, but shall, except as herein provided, be subject to chapter forty-four of the General Laws.

Sec. 14. The said city shall, at the time of authorizing said loan or bonds, provide for the payment thereof in accordance with section thirteen; and when a vote to that effect has been passed, a sum which, with the income derived from water rates, will be sufficient to pay the annual expense of operating its water works and the interest as it accrues on the bonds or notes issued as aforesaid by the city and to make such payments on the principal as may be required under the provisions of said section thirteen shall, without further vote, be assessed by the assessors of the city annually thereafter in the same manner as other taxes, until the debt incurred by said loan or loans is extinguished.

Approved May 28, 1926.

EXHIBIT "B"

Acts of 1927, Chapter 321.

AN ACT MAKING ADDITIONAL PROVISION FOR THE WATER SUPPLY NEEDS OF THE METROPOLITAN WATER DISTRICT AND FOR COMMUNITIES WHICH NOW OR HEREAFTER MAY REQUIRE WATER THEREFROM, BY THE DEVELOPMENT OF AN ADEQUATE FUTURE WATER SUPPLY FROM THE SWIFT RIVER.

Whereas, The deferred operation of this act would in part defeat its purpose, therefore it is hereby declared to be an emergency law, necessary for the immediate preservation of the public convenience.

Be it enacted, etc., as follows:

Section 1. The metropolitan district water supply commission, established by chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six, hereinafter referred to as the commission, on behalf of the commonwealth, shall forthwith, for the purpose of adding to, extending and further developing the additional sources of water supply of the metropolitan water system provided for in said chapter three hundred and seventy-five, divert into the Wachusett reservoir of the metropolitan water system the waters of the Swift river, and of Beaver brook, a tributary of the Ware river, by the construction of an extension to the Swift river of the aqueduct or tunnel between the Wachusett reservoir and the Ware river at or near Coldbrook provided for in said

chapter three hundred and seventy-five, and by the construction of a temporary diversion dam as may be required at a point on the Swift river below the confluence of the east and middle branches or at a point on the east branch near the village of Greenwich, and ultimately by the construction of a dam across the Swift river at or near the boundary line between the towns of Ware and Enfield, and of a dam across Beaver brook at or near said boundary line, thereby creating a storage reservoir in the Swift river valley. No water shall be diverted or stored in any calendar day when the flow of the Swift river at or just above the village of Bondsville in the towns of Palmer and Belchertown is less than twenty million gallons; and there shall be discharged from any storage created by the commission above said village a sufficient amount of water to maintain, so far as such storage will allow, a flow of said river at said village of not less than twenty million gallons in each calendar day.

The commission may also divert into the aqueduct or tunnel between the Wachusett reservoir and the Ware river, provided for in said chapter three hundred and seventy-five, the waters of the Quinapoxet river at a point in the town of Holden about one mile westerly from the boundary line between the towns of Holden and West Boylston. The flow of the Quinapoxet river at said point of diversion shall not be diminished by said diversion to less than one million gallons in each calendar day.

The commission shall establish and maintain proper gauging stations, or such regulating devices as may be convenient and practical, to limit the diversion of the waters of the Swift and Quinapoxet rivers as aforesaid and to establish and maintain the aforesaid flow of the Swift river at or just above Bondsville with reasonable accuracy. Copies of all records for the Swift river obtained at such stations or by such devices

shall be open to inspection during reasonable office hours, and information shall be furnished from time to time, whenever reasonably requested, to any person owning or operating any mill or manufacturing establishment below the dam across the Swift river authorized by this act, or to the mayor of any city or the chairman of the board of selectmen of any town bordering on the Swift or Chicopee rivers.

All or any part of the flood waters of the Ware river, as defined in section four of chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six, authorized to be diverted at or near Coldbrook by said chapter three hundred and seventy-five, or of the waters of the Quinapoxet river herein authorized to be diverted, may be diverted, at such times as may be necessary or desirable for storage, into the Swift river reservoir pending the ultimate diversion thereof into the Wachusett reservoir.

Sec. 2. The commission may construct as a part of the metropolitan water system such aqueducts, tunnels, dams, reservoirs and other works as in its opinion may be necessary for the additions, extensions and developments authorized by this act and all structures and appurtenances that in the opinion of the commission are desirable as incidental or complementary to such additions, extensions and developments. The commission shall also collect and publish in its reports such information as to the geology of the region in which any of the works which it is authorized to construct may be located as may be of value in connection with the geological history of the state. The works authorized by this act shall be of such dimensions, capacities and areas as the commission may determine, and may from time to time be enlarged or modified as the commission may determine; and may be so constructed, enlarged or

modified as to allow for a future increase in capacity to take care of the diversion of other streams in substantial accordance with the plans and recommendations of the joint board on water supply needs and resources of the commonwealth as contained in its report to the general court in nineteen hundred and twenty-two printed as house document fifteen hundred and fifty of that year; but nothing in this act shall be held to authorize any taking or diversion of any waters of the Millers river watershed or to affirm the intention of taking at any future date any unutilized flood waters of said Millers river.

Except as otherwise in this act provided, all the property acquired and works constructed under this act shall when completed be turned over to the metropolitan district commission, and shall thereafter be maintained and operated by it as a part of the metropolitan water system under chapter ninety-two of the General Laws with all the powers and duties conferred by said chapter.

Sec. 3. In constructing the works authorized by this act the metropolitan district water supply commission shall proceed with the organization and in the manner provided by said chapter three hundred and seventy-five. All of the provisions of section two of said chapter three hundred and seventy-five relative to the employment of laborers, workmen and mechanics and relative to the appointment, removal and fixing of compensation of all employees of the commission, including the appointment and removal of a chief engineer, shall apply in carrying out the provisions of this act. None of the employees of the commission, whether appointed before or after the effective date of this act, shall become members of the state retirement system, but those who are members thereof at the time of their employment may be continued therein.

Sec. 4. For any of the purposes of this act, or for the further protection of the purity of the waters to be diverted under this act, or for the purpose of providing for a future increase in the capacity of the Swift river reservoir, the commission on behalf of the commonwealth may, at any time and from time to time, take by eminent domain or acquire by purchase or otherwise, such lands, waters, water rights, easements and other property or interests in property, including any cemetery, as it may deem necessary or desirable; provided, however, that the amount of water to be let down into the Swift river as provided in section one of this act shall not be diminished by any taking under this act.

The commission shall take or otherwise acquire in fee all lands which will be submerged by the construction of dams and reservoirs under this act.

For any of the purposes of this act, the commission may take and use the waters of any great pond within the watershed of the Swift river, and thereafter any other public use of such great pond and the waters thereof shall cease.

The commission may also take and use, for the purposes of this act or of said chapter three hundred and seventy-five, any land or rights in land of the commonwealth upon such terms and conditions as may be agreed upon by the commission and the state department or other authority which at the time is vested by the commonwealth with the care and control of such lands or rights, and if the commission and such department or other authority cannot agree upon said terms and conditions, then such terms and conditions shall be fixed by the governor and council.

Any taking under this act, except as hereinbefore in this section provided, may be in fee or otherwise perpetual in dura-

tion or for a limited period of time, according as the commission shall determine and set forth in the order of taking.

All takings under this act of property or rights in property and all proceedings in relation to or growing out of such takings shall conform to the provisions of chapter seventy-nine of the General Laws, except in the following particulars:

(*a*) The commission need make no award of damages sustained by persons or corporations in their property by any such taking.

(*b*) The notice required by section eight of said chapter seventy-nine may be given at any time within one year after the recording of the order of taking as provided in section three of said chapter.

(*c*) Petitions for the assessment of damages under section fourteen of said chapter seventy-nine may be filed within two years after the recording of the order of taking provided for in said section three, but petitions for the assessment of damages for the taking of rights of diversion appurtenant to land not taken may be filed within two years after, and not before, the actual diversion. The last six lines of section sixteen of said chapter seventy-nine, beginning with the word "but" in line three, shall have no application to takings under this act.

(*d*) For all property taken under this act except rights of diversion appurtenant to land not taken, the right to damages shall vest upon the recording of the taking in the registry of deeds. For all rights of diversion taken under this act appurtenant to land not taken, the right to damages shall vest upon and not before the actual diversion of water.

At any time after the passage of this act, the commission before or after the actual diversion of water may make such

settlements as it may deem for the best interests of the commonwealth with any person or corporation who may be or has been damaged by any taking of or injury to his water rights under this act and in making any such settlements the commission may, subject to the approval of the governor and council, make a contract, which shall be in a form approved by the attorney general and shall be binding upon the commonwealth and such owner or person and his successors in title, with respect to the amount of the flow down the stream to which such water rights are appurtenant, or to the time and manner of such flow, or may agree to furnish in some other way a substitute for the water rights which have been or may be taken or injured. Such contract, if acknowledged by the owner or commission or any member of it before a justice of the peace or a notary public, may be recorded in the registry of deeds in the county in which the land to which such water rights are appurtenant is situated.

Sec. 5. Any person or corporation owning at the time of the passage of this act any real estate which is not taken or purchased for the reservoir or the protection of the waters thereof under the provisions of this act situated within the territory comprised in the towns of Dana, Enfield, Greenwich and Prescott or within those portions of the towns of Belchertown, Hardwick, Pelham, Petersham, New Salem, Shutesbury and Ware not more than one mile distant from land required to be purchased or taken in fee under the second paragraph of section four of this act which real estate is decreased in value by the carrying out of the provisions of this act, or any person or corporation owning at the time of the passage of this act an established business on land within territory defined in this paragraph, which business is decreased in value, whether by loss of custom or otherwise, by the carrying out of the pro-

visions of this act shall be entitled to recover damages in the manner hereinafter provided in this section. The commission, however, in its discretion, if it finds that any such person or corporation has an established business located near to but outside the areas defined in this paragraph which has been actually decreased in value by the carrying out of the provisions of this act and which person or corporation would have been entitled to damages under this section if located within the areas defined in this paragraph, may make such settlement by agreement with such person or corporation as it may deem just, but only upon the filing of a claim therefor within the time hereinafter provided in this section.

Any resident of the towns of Dana, Enfield, Greenwich, Prescott or New Salem at the date of the passage of this act who had been for the six months next previous thereto regularly employed therein in a manufacturing establishment or in an established business or upon any lands and is not the owner or part owner of any interest in any such business or lands who, by the carrying out of the provisions of this act, is deprived of such employment and obliged to seek other employment or has suffered a diminution in wages shall, if upon reasonable effort he has been unable to secure such employment or to avoid such diminution in wages, be entitled to recover either by agreement with the commission or in the manner hereinafter provided in this section his damages in loss of or diminution in wages, not exceeding, however, the amount of wages received by him for the six months previous to such loss of employment. No person shall have any right of recovery for more than one such loss of employment or one such diminution in wages under the provisions of this paragraph, and no person shall have the right to recover for both injury to an established

business under the provisions of the preceding paragraph and for loss of employment therein.

Any wage earner who at the time of the passage of this act resides in the town of Dana, Enfield, Greenwich, Prescott or New Salem who makes no other claim for damages under this act shall in case he is forced by the carrying out of this act to remove to a locality more than eight miles from land required to be taken in fee under the second paragraph of section four of this act be repaid the actual cost of such removal to an amount not exceeding fifty dollars.

Any person or corporation claiming to be injured as provided in this section, if such person or corporation so elects, may, after November first, nineteen hundred and twenty-eight but not later than six months from the date of the annexation of the towns of Enfield, Greenwich and Prescott, as provided in section thirteen of this act, file with the commission a sworn statement of his claim, setting forth the facts upon which it is based and the amount claimed, and if the commission cannot agree with such claimant upon the amount of such damage, or if the payment agreed to of such claim is not made within six months after such sworn statement is filed, then for determination of his damages, such claimant may within sixty days thereafter file a sworn copy of such statement of claim with the board of referees hereinafter provided. A justice of the supreme judicial court, either in term time or vacation, upon application by the commission or any other party in interest and after publication, or such other notice as the court may order, shall from time to time as the need may exist appoint one or more boards of referees, each consisting of three disinterested persons for the determination of damages, and may, after notice and hearing of any parties interested, fill any vacancy on such boards. The compensation of such referees

shall be fixed by the supreme judicial court in its order of appointment, and the same, together with such expenses as may necessarily be incurred by the said referees, shall if approved by the said court be paid by the commission. The board shall determine its procedure, including all matters relating to the form and place of application subject to the approval of said court. Upon reference of any claim within the provisions of this section, and after notice to the parties and hearing thereon, the board shall determine the amount of damages suffered and shall certify its findings to the commission; which findings shall be conclusive upon all parties except that any party in interest aggrieved by a ruling of the referees on a question of law may object thereto and the supreme judicial court shall have power to review and modify any finding to the extent that it may be an error in that respect, but not otherwise. If any person or corporation has a claim for damage under this section and also a claim for damages to property or rights in property within the provisions of section four of this act, the referees to whom said first named claim is referred under the provisions of this section shall, upon written application by the claimant, with the assent of the commission, have jurisdiction to determine both said claims.

Any person or corporation presenting a claim under this section for decrease in value of any parcel of land or of a business shall have no further claim under this section for damages to such land or business and all existing claims whether for damages to land, business or employment shall be included in one statement.

No right to recover damages or to receive any payment under this section shall be assignable, but any such right shall survive to the heirs at law of the party entitled.

Sec. 6. Prior to the taking under section four of this act of any land or rights in land within the territory described in the first paragraph of section five of this act which will be required for the reservoir or the protection of the waters thereof, the owner of any such land or rights in land may at any time after November first, nineteen hundred and twenty-eight, if he so elects, file with the commission a sworn statement of the location, nature and extent of such land or rights together with such further information as the commission may require, the sum he is willing to accept therefor and a request that such land or rights be acquired. If in the opinion of the commission such land or rights are within the said territory and will be required, it shall with all due diligence make a search of the title and if it deems it necessary a survey, and shall furnish said owner with a statement of any defects in the title as soon thereafter as the owner delivers to the commission a deed and all other instruments necessary to convey to the commonwealth a merchantable title to such land or rights and files a sworn copy of said statement with the board of referees, as provided in section five of this act, he shall have a claim for damages for the value of such land or rights, which value said board shall determine, as provided in said section five, unless a settlement has been previously effected by agreement. The said board shall certify its findings to the commission and the owner, which said findings shall be conclusive upon all parties except as otherwise provided in said section five.

In determining the value of any land acquired under this section within the territory described in the first paragraph of section five of this act, or the damage to any business as provided in the first paragraph of said section five, said board of referees may include in such value of land or damage to business such depreciation of value of land or decrease in

value of business, if any, in addition to any damages which would otherwise accrue, as in the opinion of the said board may have been caused between January first, nineteen hundred and twenty-six, and the date of the passage of this act by reason of proposed legislation resulting in this act.

The board of referees may consider as an element of damage, in determining the value of any land used for farming purposes acquired under this section and owned at the date of the passage of this act by a person whose principal business is farming and who is no longer to continue that occupation in that neighborhood, any difference between the fair value of tools and implements used by him for farming purposes and the value thereof at a forced sale.

Sec. 7. The commission may either before a taking or afterward make such settlements as it may deem for the best interests of the commonwealth with any person or corporation having a valid claim under this act.

Sec. 8. If any public ways are within the area taken in fee by the commission, such portions thereof as the commission shall determine shall, at such time after such taking as the commission shall so notify the public authorities charged with their continuance and maintenance, be discontinued. The commission shall provide, when reasonably practicable, and public necessity or convenience require, other suitable ways in lieu of those discontinued, and may acquire by purchase or otherwise as provided by this act any lands or rights in land needed therefor. The practicability, public necessity and convenience and the location and character of any such new ways shall be determined by agreement between the commission and the county commissioners of the county or counties in which any discontinued way is situated, or, if they are unable to agree, by the department of public works.

The commission shall cause such public ways as it shall establish or alter under the provisions of this section to be constructed and graded so that they shall be reasonably safe and convenient for travel, and shall upon the completion of such ways give written notice to the selectmen of the town in which each such way or portion thereof is located that such way is open for travel, and thereafter such ways or parts thereof shall be maintained and kept in repair by the towns in which they are located. If however the total highway mileage other than state highways within such portion of any town as is not taken or acquired in fee under the second paragraph of section four of this act shall because of the relocations caused by the carrying out of this act exceed the mileage in such portion of said town at the time of the passage of this act, said commission shall pay to such town any amount which the governor and council shall deem proper for the added burden for the future care and maintenance of such additional highway mileage.

Any public ways or portions thereof within the area taken in fee by the commission shall, until such time as they may be discontinued as provided in this section, continue to be maintained as highways with the same rights and duties of counties, towns and other parties as before such taking, except that such public ways in the towns of Enfield, Greenwich and Prescott shall, after the annexation of said towns, as hereinafter provided, be maintained by the commission to the extent and in the manner provided in section seventeen of this act.

Sec. 9. If any burial ground, cemetery, grave or place of human burial is within the area taken in fee by the commission, or is located so near to the reservoir or other waterway as to be liable to pollute or reduce the quality or value of any such waters as a portable water supply, the commission shall remove the remains found in any such burial places. The

commission may agree with the next of kin, or other persons having the right to represent or dispose of such remains, as to the place or places to and in which such remains shall be removed and reinterred, and in such case the commission may pay the reasonable cost of a burial lot and shall pay the expenses reasonably necessary for such removal, including the removal and resetting of the gravestones, monuments and markers of such graves. In any case where such next of kin or other persons are unknown or unascertainable, or where there is no such agreement, the commission shall furnish a place or places for such reburials, and may establish a general burial ground or grounds therefor, and subject to the provisions of section thirty-five of chapter one hundred fourteen of the General Laws, may acquire by purchase or otherwise as provided by this act any lands needed therefor. Any such general burial ground or grounds shall upon their completion be transferred to such trustees, persons, municipalities or public officers as may be agreed upon by the parties at interest, and in case no such agreement is made, then to the body corporate or to the public officials charged with the care of cemeteries in the town in which such burial ground is located, and any such agreement or transfer shall include the transfer of any trust funds established for the benefit or care of the cemetery or lots therein which contained remains thus removed to such general burial ground and upon any such transfer of a general burial ground, the commission shall pay to the body corporate or public officials to whom such transfer is made such additional sum as the governor and council shall deem to be requisite and reasonable for the care, maintenance and preservation of such burial ground.

Such removal of bodies shall be made without undue delay upon the request of the descendants or relatives of such de-

ceased persons or of such persons as appear to the commission to be entitled to ask for such removal. Before any existing burial ground is submerged, all bodies, tombs and monuments shall be removed. After a suitable burial ground has been provided by the commission no burial shall be made in any burial ground which will be flowed or affected by the carrying out of this act, but the bodies of any persons which would otherwise be entitled to burial in such burial ground may be buried in such lot in the new burial ground as may be provided by the commission. To whatever cemetery a body may be removed, if the lot from which the body has been taken was under perpetual care, then the additional cost, if any, for perpetual care in the place of removal to an amount not exceeding one hundred dollars shall be provided by the commission for the lot to which removal has been made.

The commission in carrying out the provisions of this section shall conform to any reasonable requirements of the board of health of the town in which any burial ground so flowed or otherwise affected is situated.

Sec. 10. The commission may alter, relocate or discontinue the whole or any parts of any rights of way belonging to any railroad corporation or electric transmission company and in case of such alteration or relocation may construct upon existing or other locations parts of the railroad or transmission line to take the place of the parts so discontinued, or the railroad or transmission line, any part of which is taken, may in whole or in part be discontinued or abandoned as and in such manner as shall be mutually agreed upon by the commission and the board of directors of the railroad corporation or electric transmission company subject to such approval as is required by law of any state or federal authorities, and if the commission and such companies cannot agree thereon, then as and in

such manner as shall be determined, on the application in writing of either party, by the department of public utilities, which is hereby authorized and directed to adjudicate finally upon all questions relative thereto, subject to such approval of any federal authorities as is required by law. If the commission shall be of the opinion that any such alteration or construction requires that lands or rights therein be taken therefor, the commission may take or acquire by purchase or otherwise, as provided by this act, such lands or rights therein and may convey the same to the railroad corporation or electric transmission company to be thereafter held and used as the property of such corporation or company for railroad or transmission line purposes, and such railroad corporation or electric transmission company may file a description of said relocation with the county commissioners and may maintain and operate said relocated lines of railroad or transmission lines with the same powers, rights and duties as in the case of the original lines.

The provisions of section five of this act shall not apply to railroad corporations or to electric transmission companies engaged in supplying electricity in bulk, as such term is defined in section one of chapter one hundred and sixty-four of the General Laws, or to other public utilities directly engaged in interstate commerce.

In any claim by any railroad corporation or electric transmission company for damages arising from the carrying out of this act, the relocation of the railroad or electric transmission line right of way of such corporation or company may be shown in mitigation of damages.

Sec. 11. In carrying out the powers and duties conferred upon it by this act the commission may construct and maintain dams, buildings, machinery, roads, conduits and aqueducts, may

lay and maintain pipes, drains and wires, may alter or change the grade or direction of any water course, may carry and conduct any aqueduct, conduit, pipe, drain, or wire under or over any water course or any railroad, street or other way in such a manner as not unnecessarily to obstruct or impede travel thereon, may dig up any such road, street or way and lay, maintain and repair aqueducts, conduits, pipes, wires and other works, beneath the surface thereof, conforming to any reasonable regulations made by the mayor and aldermen of cities and the selectmen of towns, respectively, wherein such works are performed and restoring, so far as practicable, any such road, street, or way to as good order and condition as the same was in when such digging was commenced; may make such surveys and borings and do such other preliminary work on private lands as it may determine to be necessary or desirable, doing as little damage as possible and paying for the same; may enter upon and use land owned by others and, so far as practicable, shall heed all reasonable requests made by such owners; and in general may do any other act or thing necessary or proper for carrying out the powers and duties conferred upon it by this act.

The commission shall have exclusive right and control during construction and until turned over to the metropolitan district commission or to others as authorized in this act, of all properties, ponds, water sources, cemetery sites and other works of every description purchased or taken by the commission or constructed by it under this act, and may order any or all persons to keep from entry in or upon the same and shall, through their agents, have full power to carry out these provisions with respect thereto, and the courts having jurisdiction shall have full authority for the enforcement of the provisions of this section.

The commission shall provide, or may agree with the local authorities in any town in which work is done under this act to pay for such additional police protection as is made necessary by the doing of such work.

No town within which are included the areas of Enfield, Greenwich or Prescott taken in fee for reservoir purposes or for reservoir protection shall be required after the completion of the reservoir to bear any costs of or expenses for schools, policing or fire, gypsy moth or other insect pest protection within said reservoir areas described in this paragraph.

Sec. 12. Any town, other than Enfield, Greenwich or Prescott, from which any property which it holds in its private or proprietary capacity is taken under this act or which is otherwise constitutionally entitled to compensation for damage suffered under this act, may recover such damage from the commonwealth, in the manner provided by section four of this act.

Sec. 13. Upon the expiration of thirty days from the recording of an order of taking as provided by section four of this act by which taking, together with previous purchases or takings as provided by said section four, of land in the towns of Enfield, Greenwich and Prescott, the whole or a substantial part of said towns is taken, and after notice thereof to the towns to be affected by annexation as hereinafter described in this section, the territory within the towns of Enfield, Greenwich and Prescott shall be annexed to the adjacent towns, and to the counties in which such adjacent towns are located in the following manner:

(*a*) There shall be annexed to the town of New Salem, and thereby to Franklin county, those portions of the towns of Prescott, Greenwich and Enfield, being portions of Hampshire county, bounded as follows: beginning at the intersection of

the boundary lines of the towns of New Salem, Prescott and Shutesbury and following the existing channel of the west branch of the Swift river in a general southerly direction to its confluence with the Swift river; thence following the existing channel of the Swift river and its middle branch in a general northeasterly direction to the point where it is crossed by the boundary line between the towns of Prescott and Dana; thence following the boundary line between the towns of Prescott and Dana in a general northerly direction to its intersection with the boundary line of the town of New Salem; thence following the boundary line between the towns of New Salem and Prescott in a general westerly direction to the point of beginning.

(*b*) There shall be annexed to the town of Dana, and thereby to Worcester county, those portions of the towns of Prescott and Greenwich, being portions of Hampshire county, bounded as follows: beginning at the point where the middle branch of the Swift river crosses the boundary line between the towns of Dana and Prescott and following the existing channel of said middle branch in a general southerly direction to its confluence with the east branch of said river; thence following the existing channel of said east branch in a general northeasterly direction to the boundary line between the towns of Greenwich and Hardwick; thence following the boundary line between the towns of Greenwich and Hardwick in a general northeasterly direction to its intersection with the boundary line of the town of Dana; thence following the boundary line between the towns of Dana and Greenwich in a general northerly direction to its intersection with the boundary line of the town of Prescott; thence following the boundary line between the towns of Dana and Prescott in a general northerly direction to the point of beginning.

(*c*) There shall be annexed to the town of Hardwick, and thereby to Worcester county, that portion of the town of Greenwich, being a portion of Hampshire county, bounded as follows: beginning at the most westerly corner stone on the boundary line between the towns of Hardwick and Greenwich located about two-thirds of a mile southerly from the outlet of East pond; thence running due west ~~to~~ the existing channel of the east branch of the Swift river; thence following the existing channel of said east branch in a general northeasterly direction to its intersection with the boundary line between the towns of Hardwick and Greenwich; thence following said boundary line between the towns of Hardwick and Greenwich in a general southerly direction to the point of beginning.

(*d*) There shall be annexed to the town of Ware those portions of the towns of Greenwich and Enfield, all of said towns being in Hampshire county, bounded as follows: beginning at the aforesaid most westerly corner stone on the boundary line between the towns of Hardwick and Greenwich located about two-thirds of a mile southerly from the outlet of East pond; thence running due west to the existing channel of the east branch of the Swift river; thence following the existing channel of said east branch and of the Swift river in a general southwesterly direction to the intersection of the boundary line of the towns of Ware, Belchertown and Enfield; thence following the boundary line between the towns of Ware and Enfield in a general easterly direction to its intersection with the boundary line of the town of Hardwick; thence following the boundary line between the towns of Hardwick and Enfield in a general northerly direction to its intersection with the boundary line of the town of Greenwich; thence following the boundary line between the town of Hardwick and Greenwich in a general northerly direction to the point of beginning.

(*e*) There shall be annexed to the town of Belchertown that portion of the town of Enfield, both of said towns being in Hampshire county, bounded as follows: beginning at the intersection of the boundary lines of the towns of Belchertown, Pelham and Enfield; thence running due east to the existing channel of the west branch of the Swift river; thence following the existing channel of said west branch and of the Swift river in a general southerly direction to the boundary line between the towns of Belchertown and Enfield; thence following the boundary line between the towns of Belchertown and Enfield in a general northwesterly direction to the point of beginning.

(*f*) There shall be annexed to the town of Pelham that portion of the town of Enfield, both of said towns being in Hampshire county, bounded as follows: beginning at the intersection of the boundary lines of the towns of Belchertown, Pelham and Enfield; thence running due east to the existing channel of the west branch of the Swift river; thence following the existing channel of said west branch in a general northerly direction to the intersection of the boundary lines of the towns of Prescott, Pelham and Enfield; thence following the boundary line between the towns of Pelham and Enfield in a westerly and southerly direction to the point of beginning.

Sec. 14. All the property belonging to the towns of Enfield, Greenwich and Prescott shall upon the annexation of said towns to adjacent towns by authority of this act, vest in and become the property of the commonwealth for the benefit of the metropolitan water district, and the commonwealth shall succeed to all the rights, claims and causes of action of each of said towns, and shall assume and be liable for all the debts, obligations, trusts, duties and liabilities of each of said towns. All actions and causes of actions by or against the said towns

of Enfield, Greenwich and Prescott pending or accrued, when such annexation takes effect, shall survive, and may be prosecuted to final judgment and execution by or against the commonwealth. All books, papers, monies and other property in the possession of the treasurer of each of these three towns or of any town officer thereof shall be turned over to the commission at the time of said annexation, and the commission shall wind up and liquidate the affairs of each such town as speedily as possible. Upon the final liquidation of the affairs of the towns of Enfield, Greenwich and Prescott, the commission shall turn over such of the records of said towns respectively as are of permanent value to the towns of Belchertown, Dana and New Salem, respectively, and said records shall be preserved with the records of the town to which they have been so turned over.

Upon such annexation the division of accounts of the department of corporations and taxation shall audit the books and accounts of the collector of taxes of each of the towns of Enfield, Greenwich and Prescott, respectively, and all taxes assessed for the year of such annexation and remaining uncollected, except taxes assessed upon property acquired by the commission under the second paragraph of section four of this act, to persons residing on property located within the territory annexed to another town shall be, by the assessors of the town in which such taxes were assessed, committed to the collector of taxes of the town to which such territory is by the provisions of this act annexed. It shall be the duty of any collector of taxes to whom any such taxes are committed to complete the collection of such taxes with legal interest and costs and pay over the same to the treasurer of the town for which he is the collector.

Upon the annexation to adjacent towns of the territory

within the towns of Enfield, Greenwich and Prescott as set forth in this act, the commission or the metropolitan district commission shall yearly in the month of November reimburse each of said adjacent towns for all money paid out or expenses incurred under the laws of the commonwealth for the year preceding in the relief or aid of persons whose settlement was gained in whole or in part whether by original acquisition or derivation within the territory annexed to each of said towns respectively prior to the date of such annexation.

Sec. 15. Annexation under this act shall constitute the annexed territory part of the town and the county to which it is annexed with respect to the jurisdiction of the courts, as well as for all other purposes. All suits, proceedings, complaints and prosecutions, and all matters of probate, which shall be pending at the time of such annexation before any court or trial justice, or such matters as may be incident thereto, may however be heard and determined and prosecuted to final judgment and execution before such court or justice as if said annexation had not taken place; but upon such annexation taking place, the several courts and trial justices having jurisdiction over the respective towns to which the territory within said towns of Enfield, Greenwich and Prescott is annexed shall have jurisdiction of all civil actions, matters of probate and insolvency and criminal prosecutions thereafter begun, although the cause of action has accrued, or crime, offense or misdemeanor has been committed, before such annexation, in the same manner and to the same extent as if such territory had been annexed prior to the accrual of the cause of action or the commission of the crime, offense or misdemeanor.

Sec. 16. An inhabitant of the town of Enfield, Greenwich or Prescott, when annexed to an adjacent town by authority

of this act, who remains upon the annexed territory, or who removes to a place within the limits of the town to which the land upon which he resided has been annexed, as such limits existed prior to such annexation, shall have the same right to vote at a town meeting in such town, or at an election of town officers, that he would have had if the annexed territory had constituted a part of said town for six months prior to such meeting or election.

Sec. 17. During any interval between the annexation of said towns of Enfield, Greenwich and Prescott and the taking possession of the land taken therein by the commission under this act, the commission shall maintain the public ways, public schools and other public works and public institutions in said towns to such extent and in such manner as the commission may deem necessary for the convenience, comfort and welfare of the inhabitants remaining therein.

Sec. 18. No person shall acquire against the commonwealth any rights by prescription or adverse possession in any lands or rights in lands of the commonwealth acquired by the commission under the provisions of this act or of chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six.

Sec. 19. The commission may at any time sell at public or private sale, or exchange or lease any property, real or personal, or any easement or water right including any land in new cemeteries provided for in section nine of this act, whether taken by eminent domain or otherwise acquired, which in the opinion of the commission is no longer needed for the purposes of this act. Any sums of money so received shall be applied by the state treasurer to construction costs or to reduce the bonded indebtedness for the works. The commission, and

after said works have been turned over to the metropolitan district commission, the metropolitan district commission, may by lease, license or contract permit the construction and maintenance on or over any land or waters under its control, of towers, poles, wires and other structures for the purpose of transmitting electric power, and may construct, maintain and operate such power plants and other structures as may in its opinion be necessary to utilize the fall of water created at any of the dams, channels, tunnels, or other structures under its control, for the production of power or electricity; may locate, construct and maintain lines for transmitting the same; and may use, sell or contract for the sale or use of any power or electricity so created, and any sums of money so received shall be applied to reduce the charges of maintenance of the metropolitan water district.

Sec. 20. The provisions of sections six and seven of chapter fifty-nine of the General Laws shall be applicable to land acquired in fee by the commission under this act for reservoir purposes or for the protection of the reservoir except to land within the present limits of the towns of Enfield, Greenwich and Prescott. On the land in these three named towns acquired previous to the date of their annexation, the commission shall pay to each said town in which the respective land is located until such time as the annexation of said town, as provided in section thirteen of this act, a sum in lieu of taxes computed and paid as provided in said sections six and seven of said chapter fifty-nine, but including for this period the buildings and structures thereon. Subsequent to said annexation neither the commission nor the metropolitan district commission shall pay any taxes or make any payments in lieu of taxes on land or buildings within the present limits of the said towns of Enfield, Greenwich and Prescott.

As full compensation for any loss of taxation or any other loss caused by the carrying out of the provisions of this act, the commission shall pay to the county of Hampshire the sum of fifty-five thousand dollars, which sum shall be paid at the time of the annexation of the towns of Enfield, Greenwich and Prescott to adjacent towns.

Sec. 21. Whenever by the provisions of this act the commission is required to make annual payments over a period of years, it may by agreement with the parties interested make a settlement by payment of a liquidated amount, if it deems it advisable so to do.

Sec. 22. Any town or fire or water district on the water shed of the Swift river may take from this river above any dam constructed under this act across said river so much of the water thereof as it has already been or may hereafter be authorized by the legislature to take for supplying its inhabitants with water, and in case any such town or district shall hereafter on its application therefor be authorized to take such water, the point of connection with and entrance into said river or any pond, reservoir or waters thereof and the location of any pipes, aqueducts, conduits, wells or other water courses laid or constructed on land of the commonwealth shall be determined by agreement between such town or district and the metropolitan district commission, and such town or district shall pay to the commonwealth for the account of the metropolitan water district, all damages to the land, structures or other property of the commonwealth caused by such taking, connection or entrance; and it shall further pay to the commonwealth for the account of the metropolitan water district, a fair proportion of the cost incurred by the commonwealth for the acquisition under the provisions of this act of the waters of said river, or rights therein, and for the construction, maintenance and

operation of such works and structures as are authorized by this act, including a fair proportion of the cost of maintaining the purity of said water, the said damages and proportion to be determined by the metropolitan district commission and by such applicant town or district, and, if they cannot agree, such damages and proportion shall be determined by a master to be appointed by the supreme judicial court on petition by the commonwealth or said applicant town or district, and the report of the master, when affirmed by said court, shall be final and conclusive upon all parties.

Sec. 23. No persons shall, after the passage of this act, erect a dam for mill purposes across the Swift river, or any of its tributaries above the village of Bondsville, without the consent in writing of the commission, or, after said works have been turned over to the metropolitan district commission, of said metropolitan district commission. In granting its consent, either commission may impose such conditions as it may deem to be for the public interest. Any person who is constitutionally damaged in his property by the refusal of such consent or by the imposition of such conditions, may recover from the commonwealth the damage so caused in the manner provided in section four of this act.

Sec. 24. The supreme judicial court or any justice thereof and the superior court or any justice thereof, during a sitting of the court or in vacation, on the petition of the commission or of any city, town, corporation or person interested, or of the attorney of any such petitioner, shall have jurisdiction in equity or otherwise to enforce the provisions of this act and of any rule, regulation or order made under the authority of the same and to prevent any violation of said provisions, rules, regulations or order; provided, however, that no suit in which the right of the commission to make any taking authorized by

this act is questioned shall be brought except in the supreme judicial court for the county in which said taking has been made or is to be made, nor unless the said suit is brought within six months after the passage of this act.

If any part, subdivision or section of this act shall be declared unconstitutional the validity of its remaining provisions shall not be affected thereby.

Sec. 25. All general laws relating to the water supplies of cities and towns or the lands and other property used for such supplies and the provisions of sections ten to twenty-three, inclusive, of chapter ninety-two of the General Laws shall in so far as they are not inconsistent with the provisions of this act apply to and be observed in carrying out the purposes of this act. The provisions of chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six shall continue in force except as modified by the provisions of this act, but nothing in this act shall be held to authorize any taking or diversion of the waters of the Ware river in excess of that authorized under the provisions of said chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six.

Sec. 26. Any church or religious society established in the towns of Dana, Enfield, Greenwich, New Salem or Prescott may within five years from the passage of this act file in the probate court or in the supreme judicial court for the county in which such town is located a petition in equity representing that by reason of the construction of the reservoirs and other works contemplated by this act it will be impracticable for such church or religious society thereafter to continue its services of worship or otherwise to carry out the purposes for which it was established and thereupon, after such notice to the attorney general and other persons interested as the court in which such petition is filed may direct, said court may

authorize such church or religious society to convey by deed all property real and personal held by it for its own purposes or upon any trust (including the beneficial interest in any trust property held for the benefit of such church or religious society, also any and all contingent rights and interests and any right to damages vested in such church or religious society under the terms of chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six or under the terms of this act) to such appropriate person or corporation as the court may determine, to be held and administered by such person or corporation in such manner and upon such trusts as the court may designate and may further direct that upon the making of such conveyance and upon the filing of a certified copy of the deed and of the decree authorizing the same in the office of the secretary of the commonwealth such church or religious corporation shall be deemed to be dissolved. If any property conveyed pursuant to a decree entered upon such petition shall thereafter be taken under the provisions of either of said acts, the person or corporation to which such property shall have been so conveyed shall have the same right to damages as such church or religious society would have had if it had not conveyed such property. Before entering a decree as hereinbefore provided, the court shall ascertain whether any rights by way of reverter or otherwise are vested in any person or corporation in any property held by or for the benefit of such church or religious society upon the dissolution of such church or religious society, the discontinuance of its activities, its ceasing to use said property or any other contingency, and, if it shall appear that a conveyance of any such property as hereinbefore provided would be inconsistent with any such rights, the court, if any action appears to be necessary in order to effect a lawful and complete disposition of such property,

shall direct that the same be conveyed to the person or corporation found to be entitled thereto in the existing state of things or devise a plan for the application thereof in a manner consistent with such rights. The remedies hereby given shall be in addition to any remedies afforded by existing law.

Sec. 27. For the purpose of carrying out the provisions of this act, the commission may expend such amounts not exceeding in the aggregate fifty million dollars, as may from time to time be approved by the governor and council. To meet such expenditures, the state treasurer shall, from time to time, on the request of the commission and subject to such approval, issue bonds of the commonwealth to an amount not exceeding the sum of fifty million dollars, which shall be a further addition to the loans authorized by section eight of chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six, and by section six of chapter one hundred and eleven of the acts of nineteen hundred and twenty-seven.

Such bonds shall be issued as coupon or registered bonds, for such term of years as may be recommended by the governor, in accordance with section three of Article LXII of the amendments to the constitution, and shall bear interest at such rate as shall be fixed by the state treasurer, with the approval of the governor and council. The amounts necessary to meet interest and serial payment requirements on said bonds and the expenses of maintaining and operating the works to be constructed by the commission under this act, and such other expenses as may be authorized hereunder, shall be added to the annual assessments upon the cities and towns comprising the metropolitan water district and apportioned and collected as provided by section twenty-six of chapter ninety-two of the General Laws.

Approved April 26, 1927.

EXHIBIT "C"

LAWS FOR THE PROTECTION AND PRESERVATION OF THE NAVIGABLE WATERS OF THE UNITED STATES

Extract from the River and Harbor Act Approved March 3, 1899.

30 Stats. L., vol. 30, pp. 1151-1155.

Construction of bridges, consent of Congress necessary for.

SEC. 9. That it shall not be lawful to construct or commence the construction of any bridge, dam, dike, or causeway over or in any port, roadstead, haven, harbor, canal, navigable river, or other navigable water of the United States until the consent of Congress to the building of such structures shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of War: *Provided,* That such structures may be built under authority of the legislature of a State across rivers and other waterways the navigable portions of which lie wholly within the limits of a single State, provided the location and plans thereof are submitted to and approved by the Chief of Engineers and by the Secretary of War before construction is commenced: *And provided further,* That when plans for any bridge or other structure have been approved by the Chief of Engineers and by the Secretary of War, it shall not be lawful to deviate from such plans either before or after completion of the structure unless the

Bridges may be built under State legislation.

Plans must be approved before construction is begun.

Approved plans must be adhered to.

modification of said plans has previously been submitted to and received the approval of the Chief of Engineers and of the Secretary of War.

Creation of obstructions forbidden.

SEC. 10. That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same.

Construction of wharves, etc.

Alteration etc., of channels.

FILE COPY

NOV 25 19
CHARLES ELMORE
CL

Supreme Court of the United States

OCTOBER TERM, 1929

~~12~~

No. 12, ORIGINAL

THE STATE OF CONNECTICUT, COMPLAINANT

v.

THE COMMONWEALTH OF MASSACHUSETTS, DEFENDANT

IN EQUITY

MOTION FOR LEAVE TO FILE MOTION TO DISMISS DEFENDANT'S ANSWER.

MOTION TO DISMISS DEFENDANT'S ANSWER.

BENJAMIN W. ALLING,
Attorney General of the State of Connecticut and Solicitor and Counsel for the Plaintiff.

ERNEST L. AVERILL,
Deputy Attorney General of the State of Connecticut.

BENEDICT M. HOLDEN,
of Counsel.

THE CASE, LOCKWOOD & BRAINARD CO.
HARTFORD, CONN.

In the
Supreme Court of the United States

No. 13, ORIGINAL

STATE OF CONNECTICUT, COMPLAINANT

v.

COMMONWEALTH OF MASSACHUSETTS,
DEFENDANT

NOTICE

To the Commonwealth of Massachusetts, defendant herein, and to the Honorable Joseph W. Warner, Attorney General of said State and solicitor of the Defendant:

You will please take notice that at the incoming of the Supreme Court of the United States, at 12:00 o'clock M., at the Capitol Building in the City of Washington, District of Columbia, upon Monday, November 4, 1929, or as soon thereafter as solicitors can be heard, the above named complainant will appear by its solicitors and present to said court the motion of said complainant to dismiss the defendant's answer to the bill of complaint, and ask leave of Court to file the same; and further request that leave be granted to argue said motion orally and that a time be fixed for such purpose; a copy of which motion to dismiss is presented herewith; when and where you may be present if you so desire.

BENJ. W. ALLING,
Attorney-General,
State of Connecticut.

By ERNEST L. AVERILL,
Deputy Attorney-General.

STATE OF MASSACHUSSETTS

COUNTY OF

Service of the above motion, by the delivery to me of a copy thereof, with a copy of the aforesaid motion to dismiss, is hereby acknowledged, this day of 1929.

.....

Attorney-General of Massachusetts.

In the
Supreme Court of the United States

OCTOBER TERM, 1929

Original No. 13

IN EQUITY

STATE OF CONNECTICUT, COMPLAINANT

v.

COMMONWEALTH OF MASSACHUSETTS,
DEFENDANT

MOTION FOR LEAVE TO FILE — MOTION TO DISMISS DEFENDANT'S ANSWER

The State of Connecticut, by its attorney-general, appearing in that behalf by and with the authority, consent and direction of the governor of said state, comes now here and presents this its motion for leave to file in this court a motion to dismiss the defendant's answer and further requests that said motion to

dismiss be argued orally and a time fixed for such purpose. A true copy of said motion is hereto attached.

STATE OF CONNECTICUT,

By BENJAMIN W. ALLING,
Its Attorney-General.

ERNEST L. AVERILL,
Deputy Attorney-General.

BENEDICT M. HOLDEN,
of Counsel.

In the
Supreme Court of the United States

NO. 13. ORIGINAL

STATE OF CONNECTICUT, COMPLAINANT

v.

COMMONWEALTH OF MASSACHUSETTS,
DEFENDANT

MOTION TO DISMISS DEFENDANT'S ANSWER.

And now comes the State of Connecticut, by Benjamin W. Alling, its Attorney-General, and moves to dismiss the answer heretofore filed by leave of this Court by the Commonwealth of Massachusetts, and for cause of said motion says:

1. The said answer does not allege sufficient facts to constitute a defense to the bill of complaint filed by the State of Connecticut.

2. The defendant acknowledges in paragraph two of its answer the superior power of the Government of the United States over waters within one of the United States in so far as regulatory power is given to the Government of the United States under the Constitution of the United States; and admits in paragraph five of the answer having filed applications with the Secretary of War for permits to make certain diversions of the Swift River and the Ware River; and said defendant also confesses in paragraph five of the answer that said permission had not been obtained from the Congress of the United States, the War Department or from the Secretary of War.

3. The defendant admits in paragraph seventeen on page eighteen of the printed answer that it proposes to erect dams in the valley of the Swift River for the purpose of withholding the flow of said river and diverting the waters therefrom to a reservoir about to be constructed; and that it proposes to store in said reservoir the waters of the Swift River and certain waters of the Ware River; and that said project is now in the course of execution; all of which has been done and is being done without authorization of the Congress of the United States or permission of the Secretary of War, or the approval of the Chief Engineers, and against the will of the State of Connecticut.

4. It appears from the allegations of the Answer that the Commonwealth of Massachusetts proposes to construct a diversion dam in the waters of the Ware River, which is acknowledged by the Commonwealth of Massachusetts to be within the jurisdiction of the United States as navigable waters of the United States, which construction is forbidden by Section 9 of the River and Harbor Act approved March 3rd, 1899, until the consent of Congress to the building of such structure shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of War and nowhere in said Answer does it appear that the consent of Congress has been obtained for such construction and nowhere does it appear that plans have either been submitted to or approved by the Chief of Engineers and by the Secretary of War.

5. It appears from the allegations of the Answer of the Commonwealth of Massachusetts — that the navigable capacity of the Connecticut River and one of its tributaries known as the Ware River, which are admitted to be waters of the United States, is to be obstructed by the construction of a diversion dam and the permanent removal of water from these water courses

but nowhere in said Answer does it appear that this proposed obstruction has been affirmatively authorized by Congress as provided in Section 10 of the River and Harbor Act approved March 3rd, 1899, altho by the provisions of said Section 10 the creation of any such obstruction not affirmatively authorized by Congress is prohibited.

6. It appears from the allegations of the Answer of the Commonwealth of Massachusetts that it is proposed by it to alter and modify the capacity of the channel of navigable waters of the United States, in that it is proposed to take and carry away water from the Ware River and in this manner prevent it from flowing into and becoming navigable waters of the Connecticut River but nowhere in said answer does it appear that the work has been recommended by the Chief of Engineers and authorized by the Secretary of War, contrary to the provisions of Section 10 of the River and Harbor Act approved March 3rd, 1899.

7. It appears from the allegations of the Answer that the Commonwealth of Massachusetts proposes to construct dams in the waters of the Swift River, which is acknowledged by the Commonwealth of Massachusetts to be within the jurisdiction of the United States as navigable waters of the United States, which construction is forbidden by Section 9 of the River and Harbor Act approved March 3rd, 1899, until the consent of Congress to the building of such structure shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of War and nowhere in said Answer does it appear that the consent of Congress has been obtained for such construction and nowhere does it appear that plans have either been submitted to or approved by the Chief of Engineers and by the Secretary of War.

8. It appears from the allegations of the Answer of the Commonwealth of Massachusetts — that the navigable capacity of the Connecticut River and one of its tributaries known as the Swift River, which are admitted to be waters of the United States, are to be obstructed by the construction of dams and the permanent removal of water from these water courses, but nowhere in said Answer does it appear that this proposed obstruction and permanent removal have been affirmatively authorized by Congress as provided in Section 10 of the River and Harbor Act approved March 3rd, 1899, altho by the provisions of said Section 10 the creation of any such obstruction not affirmatively authorized by Congress, is prohibited.

9. It appears from the allegations of the Answer of the Commonwealth of Massachusetts that it is proposed by it to alter and modify the capacity of the channel of navigable waters of the United States, in that it is proposed to take and carry away water from the Swift River which otherwise would flow into and become navigable waters of the Connecticut River but nowhere in said answer does it appear that the work has been recommended by the Chief of Engineers and authorized by the Secretary of War, contrary to the provisions of Section 10 of the River and Harbor Act approved March 3rd, 1899.

10. The Legislative enactments of the Great and General Court of the Commonwealth of Massachusetts as contained in Chapter 375 of the Acts of 1926 and Chapter 321 of the Acts of 1927 contain no provision authorizing the taking of any property owned by the State of Connecticut, nor do the said Acts contain any legal authorization for the taking of any property or property right located outside of the boundaries of the Commonwealth of Massachusetts.

11. The Answer of the Commonwealth of Massachusetts does not contain any allegations that the Commonwealth of

Massachusetts has actually taken the property or property right of the State of Connecticut or any citizen of the State of Connecticut, which property or property right is located within boundaries of State of Connecticut.

12. The Answer of the Commonwealth of Massachusetts contains no allegations that any Sovereign authorized and empowered to take property and property rights located within the State of Connecticut for public use has ever authorized the Commonwealth of Massachusetts or any of its Agents to take such property or property rights located within the boundaries of the State of Connecticut.

13. Property or property rights of the State of Connecticut cannot be taken or acquired by any other Sovereign without its consent and no allegations appear in said Answer that the consent of the State of Connecticut has ever been obtained for such taking.

14. The legislative enactments of the Great and General Court of Massachusetts as contained in Chapter 375 of the Acts of 1926, and Chapter 321 of the Acts of 1927, are void and of no effect in so far as concerns the right of the State of Connecticut, as a riparian owner, as a Sovereign state, as *parens patriae*, and the rights of its inhabitants, to the flow of the Connecticut River within the State of Connecticut, without diminution as to quantity or alteration as to quality by the Commonwealth of Massachusetts or its inhabitants; and said legislative enactments — in so far as they purport to alter, modify, or abrogate, the common law doctrine of the right of riparian owners to receive water flowing over their land without diminution as to quantity or alteration as to quality by upper riparian owners, which doctrine has been accepted and recognized as the law in both the Commonwealth of Massachusetts and the State of Connecticut, by the highest courts in said

Commonwealth and State — are wholly without effect and void as to rights of the State of Connecticut and of its inhabitants, as being an invasion and denial of the sovereign power of the State of Connecticut, and contrary to Constitution of the United States.

15. And the complainant says further that the Commonwealth of Massachusetts has no right or authority to divert and store the waters of the Swift River and Ware River, in such manner as is contemplated by said Commonwealth, and admitted in the answer of the defendant, and cannot acquire such right or authority by law from the Great and General Court of Massachusetts or the Congress of the United States, and cannot receive the sanction of this Court for its Acts in diverting and storing said waters in so far as said acts conflict with and deny the rights of riparian ownership to the State of Connecticut and of its inhabitants.

16. The defendant admits in various parts of the answer and more particularly in paragraph twenty thereof that it has already accomplished certain preliminary work on the construction necessary for the diversion of waters of the Swift River and the Ware River and that it proposes to continue in said work and to accomplish the diversion and storing of said waters unless enjoined by this Court from so doing; and the defendant attempts to justify such acts which have been done, are being done, and are proposed to be done on the ground that a grave emergency exists within the Commonwealth of Massachusetts in that unless a suitable supply of drinking water and of water for domestic purposes is obtained by the City of Boston and the Metropolitan area about said City the inhabitants of said area must of necessity be unable to continue the normal growth and life with reasonable safety and comfort within said area; and the defendant further seeks to excuse said acts and proposals on the ground that no damage will result therefrom to the State of

Connecticut or to the inhabitants thereof; and if any damage is likely to occur an adequate and sufficient remedy for such damage exists at law; all of which allegations of justification and excuse are evasive, uncertain, impertinent, and without merit in that such action on the part of the Commonwealth of Massachusetts would deprive the State of Connecticut and its citizens of property and property rights in violation of the Fifth and Fourteenth Amendments to the Constitution of the United States by denying to them due process of law in taking property for public use without the lawful exercise of the power of eminent domain.

Wherefore, and for divers other good causes appearing on the face of the answer, this plaintiff moves that the answer of the defendant be dismissed, and prays the judgment of this Honorable Court whether it shall be compelled to make further or any reply to said answer; and the plaintiff further prays, if the answer of the defendant be found insufficient as a defense to the bill of complaint that this Honorable Court grant the plaintiff the relief requested in the bill of complaint together with its reasonable costs.

And as in duty bound it will ever pray, etc.

THE STATE OF CONNECTICUT,

By BENJAMIN W. ALLING,
Its Attorney-General.

ERNEST L. AVERILL,
Deputy Attorney-General.

BENEDICT M. HOLDEN,
Special Counsel.

FILE COPY

FILED
NOV 25
CHARLES ELMORE

Supreme Court of the United States

OCTOBER TERM, 1929

12

No. [redacted], Original

THE STATE OF CONNECTICUT, COMPLAINANT

v.

THE COMMONWEALTH OF MASSACHUSETTS, DEFENDANT

IN EQUITY

MOTION FOR LEAVE TO FILE — MOTION TO STRIKE OUT CERTAIN PARTS OF DEFENDANT'S ANSWER.

BENJAMIN W. ALLING,
Attorney General of the State of Connecticut and Solicitor and Counsel for the Plaintiff.

ERNEST W. AVERILL,
Deputy Attorney General of the State of Connecticut.

BENEDICT M. HOLDEN,
of Counsel.

THE CASE, LOCKWOOD & BRAINARD CO.
HARTFORD, CONN.

In the
Supreme Court of the United States

No. 13, Original

THE STATE OF CONNECTICUT, COMPLAINANT

v.

THE COMMONWEALTH OF MASSACHUSETTS, DEFENDANT

NOTICE

To the Commonwealth of Massachusetts, defendant herein, and to the Honorable Joseph W. Warner, Attorney General of said State and solicitor of the defendant:

You will please take notice that at the incoming of the Supreme Court of the United States, at 12:00 o'clock M., at the Capitol Building in the City of Washington, District of Columbia, upon Monday, November 4, 1929, or as soon thereafter as solicitors can be heard, the above named complainant will appear by its solicitors and present to said court the motion of said complainant to strike out certain parts of defendant's answer to the bill of complaint, and ask leave of Court to file the same; and further request that leave be granted to argue said motion orally and that a time be fixed for such purpose, a copy of which motion to strike out is presented herewith; when and where you may be present if you so desire.

BENJ. W. ALLING,
Attorney-General,
STATE OF CONNECTICUT,
By ERNEST L. AVERILL,
Deputy Attorney General.

STATE OF MASSACHUSETTS

COUNTY OF

Service of the above motion, by the delivery to me of a copy thereof, with a copy of the aforesaid motion to strike out, is hereby acknowledged this day of 1929.

.....

Attorney General of Massachusetts

In the
Supreme Court of the United States

OCTOBER TERM, 1929

Original No.

IN EQUITY

THE STATE OF CONNECTICUT, COMPLAINANT

v.

THE COMMONWEALTH OF MASSACHUSETTS

MOTION FOR LEAVE TO FILE MOTION TO STRIKE OUT CERTAIN PARTS OF DEFENDANT'S ANSWER.

The State of Connecticut, by its attorney-general, appearing in that behalf by and with the authority, consent and direction of the governor of said state, comes now here and presents this its motion for leave to file in this court a motion to strike out certain parts of defendant's answer, and further requests that said motion to strike out be argued orally and a

time fixed for such purpose. A true copy of said motion is hereto attached.

STATE OF CONNECTICUT,
By BENJAMIN W. ALLING,
Its Attorney-General.

ERNEST L. AVERILL,
Deputy Attorney-General.

BENEDICT M. HOLDEN,
of Counsel.

In the
Supreme Court of the United States

No. 13 Original

THE STATE OF CONNECTICUT, COMPLAINANT

v.

THE COMMONWEALTH OF MASSACHUSETTS, DEFENDANT

MOTION TO STRIKE OUT CERTAIN PARTS OF DEFENDANT'S ANSWER.

Now comes the State of Connecticut by Benjamin W. Alling, its Attorney-General, and moves to strike out the following designated portions of defendant's answer for the reasons herein stated:

1. Paragraph 13, page 11, beginning with the words " and further " in the sixth line and ending with the words " of Massachusetts " in the eleventh line as follows:

> " and further answering, says that no property or person situated or living in or having interest in the Connecticut Valley, so-called, is in any way injuriously affected by any acts and things done, contemplated to be done, or threatened to be done, by the Commonwealth of Massachusetts."

Paragraph 17, page 19, beginning with the words " that in " in the twenty-fourth line and ending with the words " said diversion " in the twenty-eighth line as follows:

> " that in nowise will the State of Connecticut or the inhabitants thereof be injured or damaged, or will their

health or safety be imperilled, or will any discomfort be caused to the inhabitants of the State of Connecticut by reason of the said diversion."

Paragraph "Third", page 29, beginning with the words "and in consideration" in the 19th line and ending with the words "any damage" in the 22d line as follows:

> "and in consideration of the fact that the State of Connecticut and the inhabitants thereof will suffer no material damage by reason of the said diversion, if indeed they suffer any damage,"

For the reason that said allegations are wholly immaterial, inasmuch as the State of Connecticut and its inhabitants have the right as riparian owners to the flow of the Connecticut River within the State of Connecticut without diminution as to quantity or alteration as to quality; and any impairment of said right by the Commonwealth of Massachusetts constitutes an injury against which the protection of this Court may be invoked, and by the laws of both States present damage need not be alleged nor proven to entitle a property owner to an injunction to restrain the taking of property.

2. Paragraph 7, page 9, beginning with the words "and that" in the 7th line and ending with the words "is authorized" in the 9th line as follows:

> "and that even from this area only the diversion of certain flood waters as defined in the said legislation is authorized."

Paragraph 14, page 11, beginning with the words "but on" in the 23d line and ending with the words "said waters" in the 27th line as follows:

> "but on the contrary the defendant says that said flood waters are in nowise of benefit to said watershed but cause great and immeasurable damage to the lands, which are at times covered by said waters."

Paragraph 14, pages 11 and 12, beginning with the word "but" in the 35th line on page 11 and ending with the words "and damaged" in the 7th line on page 12 as follows:

> "but on the contrary the defendant alleges that all acts done or contemplated to be done by the Commonwealth of Massachusetts will benefit the State of Connecticut in that they will afford a means by which the damages from excessive and unsual floods may be in part controlled and reduced by withholding the said flood waters from an area which otherwise would be covered with water and damaged."

Paragraph 16, page 15, beginning with the words "and further" in the 19th line and ending with the words "citizens thereof" in the 23d line as follows:

> "And further answering, the defendant says that all acts referred to in the bill of complaint done or contemplated to be done by the Commonwealth of Massachusetts will, as herein set forth both above and hereafter, benefit the State of Connecticut and the citizens thereof,"

Paragraph 17, page 19, beginning with the words "and the defendant further" in the 28th line and ending with the words "of Massachusetts" in the 35th line as follows:

> "And the defendant further avers that by the storage of water contemplated the Commonwealth of Massachusetts will reduce somewhat the intensity and severity of certain seasonal floods which take place in the Connecticut Valley and watershed to the great damage of the inhabitants thereof, both within the State of Connecticut and within the Commonwealth of Massachusetts;"

For the reason that said allegations are immaterial, irrelevant, and impertinent to the issue; and, also, because they are highly improper in seeking to impose the judgment of the Com-

monwealth of Massachusetts on the State of Connecticut, through the contemplated control of flood waters of the Connecticut River by the Commonwealth of Massachusetts; which question of benefit is wholly political and must rest entirely with the judgment of the State of Connecticut, and is not subject to judicial review.

> " And for the further reason that flood waters are a part of the natural flow of a stream to which the riparian owners are entitled.

3. Paragraph 17, pages 16 and 17, beginning with the words "And further " in the 13th line of page 16 and ending with the words " Metropolitan area " in line 34 of page 17 as follows:

> "And further answering, the defendant says that within the city of Boston in said Commonwealth and within the area immediately about said city there is a rapidly growing population, now containing approximately 1,900,000 persons; that for a long period of time it has been apparent that the present supply of water for drinking and domestic purposes is inadequate and if not supplemented by further supplies of pure water for drinking and domestic purposes the persons residing in the Metropolitan district about the city of Boston and within said city will be unable to continue a normal growth in that region and will be subjected to discomfort, inconvenience, and grave risk and danger from sickness and epidemic; that the taking of certain of the waters of the Ware River and of the Swift River has for more than thirty years been definitely contemplated by the Commonwealth of Massachusetts for the purpose of supplying the Metropolitan area about Boston with water for drinking and other domestic uses; that a study of the water requirements of the city of Boston has gone on for over a century, and that experts in water and sanitary engineering have made frequent and well-considered reports of the situation and problem in this respect; that the overwhelming majority opinion of qualified persons who have studied the situation has determined that no other satisfactory and adequate

source of a supply of water exists for said city of Boston and the Metropolitan area about said city unless it includes the waters of the Ware and the Swift rivers, and that no other supply can possibly meet the reasonable demands and needs of the said area and of its rapidly increasing population; that the population whose needs require the proposed diversions from the Ware and Swift rivers is not only that of the metropolitan area within ten miles of the State House, but also that of several other centers whose future requirements must be met directly from metropolitan sources or from sources close to the metropolitan area which would otherwise be available to the metropolitan district itself, that the total population supplied by the district or whose water supply needs are thus intimately connected with those of the district, is over two and one-half million and rapidly growing, comprising nearly 1,900,000 in the metropolitan area itself, 300,000 in the Merrimac Valley group which have long been demanding water from the Wachusett Reservoir, 275,000 in metropolitan Worcester whose needs are met by areas allotted from the Wachusett drainage area, and 100,000 in Essex County, whose need of the Ipwsich River prevents its use by the metropolitan district; that in accordance with the reports of competent authorities the Great and General Court of Massachusetts, by its enactment of Acts of 1926, chapter 375, and Acts of 1927, chapter 321, above referred to and annexed to this answer, has provided for taking the flood waters of the Ware River, as described in said acts, and certain of the waters of the Swift River, as a source of supply of water for domestic purposes for the city of Boston and other communities in and adjoining the Metropolitan area."

Paragraph 17, pages 18 and 19, beginning with the words "that in" in the 36th line on page 18 and ending with the word "Prescott" in the 8th line on page 19 as follows:

> "that in the judgment of the Great and General Court of said Commonwealth the emergency is so great and the prospect of a failure of a domestic water supply for

the Metropolitan district is so imminent as to lead it to provide in said legislation, in order to make possible the location and construction of said reservoir, for the elimination and termination of three historic towns of said Commonwealth, to wit, Enfield, Greenwich, and Prescott;"

Paragraph 20, page 23, beginning with the word "that" in the 16th line and ending with the words "drinking purposes" in the 28th line as follows:

"that it is proposing to proceed with such work because of the pressing emergency confronting the Commonwealth with respect to providing a suitable, necessary, and adequate supply of water for drinking and domestic purposes for the city of Boston and for the metropolitan district about said city; that unless a supply is furnished within a very short period the inhabitants of the said area in and about the city of Boston will be subjected to grave and serious dangers of epidemic and disease, and that the inhabitants of the said area will have insufficient water to meet their necessary and reasonable requirements for drinking purposes;"

Paragraph "First," pages 27 and 28, beginning with the word "First" in the 33d line on page 27 and ending with the words "Ware River" in the 12th line on page 28 as follows:

"First. That a grave and serious emergency exists, as has been above set forth, within said Commonwealth of Massachusetts in that unless a suitable supply of drinking water and of water for domestic purposes is obtained by the City of Boston and the metropolitan area about said city, the inhabitants of the said area must of necessity be unable to continue their normal growth and life with reasonable safety and comfort within said area, and will be subjected to great risks and menace from disease and epidemic, because of the lack of a suitable supply of pure and unpolluted drinking water which can be obtained from no source within the Commonwealth except from the watershed of the Con-

necticut River as has been authorized in said legislation with respect to certain waters of the Swift River and the flood waters of the Ware River."

Paragraph "Third", page 29, beginning with the word "Third" in the 14th line and ending with the word "permitted" in the 19th line as follows:

> "Third. That by reason of the great emergency existing in the Commonwealth of Massachusetts as above set forth, because of the great and immeasurable suffering which would be caused to the citizens of the Commonwealth of Massachusetts if the said diversion be not permitted,"

For the reason that said allegations of emergency and necessity are immaterial, irrelevant and impertinent and are presented merely in justification and excuse of the acts complained of, the performance of which acts by the defendant would be contrary to the law of both the Commonwealth of Massachusetts and the State of Connecticut as to the rights of riparian owners; that the present controversy must be disposed of and adjudicated solely in the light of said law and not in consideration of any questions of emergency and necessity as urged by the defendant; that the said allegations ignore the possibility of a like emergency arising in the State of Connecticut because of its limited water supply and ever increasing population; and that said allegations are inaccurate and uncertain in claiming that the Swift River and the Ware River are the only available sources of potable water which may be used by the City of Boston and the Metropolitan Area, so designated.

Also for the reason that said allegations of emergency and necessity can only authorize the taking of private property and property rights for public use thru the exercise of the Sovereign power of eminent domain by a Sovereign having jurisdiction to take said property and cannot be used as a substitute for the power of eminent domain.

Also for the reason that to permit the taking of the property and property rights of the State of Connecticut and of its citizens upon the grounds of an existing necessity and emergency without the right of the Commonwealth of Massachusetts to exercise the Soverign Power of eminent domain over property and property rights of the State of Connecticut and its citizens would deprive them of their property and property rights without due process of law in violation of the 5th and 14th amendments to the Constitution of the United States.

4. Paragraph 18, page 21, beginning with the words "but on" in the 10th line and ending with the word "Connecticut" in the 35th line as follows:

> "but on the contrary the defendant avers and alleges that the State of Connecticut was fully and completely aware of the plans of the Commonwealth of Massachusetts; that the State of Connecticut was officially represented at hearings before legislative committees of the Great and General Court of the Commonwealth of Massachusetts when the acts authorizing the carrying out of the plans complained of were being considered; that the plans now adopted by the Commonwealth of Massachusetts are the result of a comprehensive study of the water supply problem of the metropolitan district of Boston and that the said study of the problem has been going on for more than a century without in any manner being kept secret; that the recommendations and reports of engineers, water and health experts and other technical students of the situation have been printed and circulated as public documents and have with practical unanimity favored the use of the waters of the Swift River and the Ware River for the purpose of said water supply, and that such waters constitute the only suitable and adequate supply available for the reasonable needs of the metropolitan district of Boston for water for domestic purposes, and that said reports of experts studying the problem have been made public and have been available to officials of the State of Connecticut."

Paragraph "First," Page 28, beginning with the words "that the" in the 19th line and ending with the words "finally enacted" in the 33rd line as follows:

> "that the State of Connecticut has well known for a long time that such reasonable diversion of the waters of the Swift and of the Ware rivers has been contemplated by the Commonwealth of Massachusetts and has failed to make reasonable representations of any damage to said State or to its inhabitants, permitting the Commonwealth of Massachusetts to proceed with its studies, investigations, and plans and to expend large sums for the furtherance of said plans, relying upon the fact that the State of Connecticut, having due notice of the said plans, made no substantial opposition to the legislation pending before the Great and General Court of the Commonwealth of Massachusetts in the form in which the said legislation was finally enacted."

Paragraph "Seventh," page 31, all of said paragraph as follows:

> "Seventh. That the State of Connecticut has well known for a long time of the plans of the Commonwealth of Massachusetts with respect to the said diversion hereinbefore described, and, after the said plans had progressed materially, brought this bill in equity to enjoin the action of the said Commonwealth, causing great expense and delay to the said Commonwealth."
>
> Wherefore, the defendant prays that it may be compensated for the said expense and delay caused by the complainant, and that it may be allowed its costs of defending this bill of complaint, thus improvidently and unnecessarily brought by the said State of Connecticut."

For the reason that said allegations of defendant that plaintiff had known or should have known of defendant's proposals to divert and store certain waters of the Swift and Ware River, and had made no protest or objection to the making by the Com-

monwealth of Massachusetts of plans, preliminary investigations and studies, contemplating the final execution of said proposals, do not constitute a sufficient defense; inasmuch as no duty was imposed on the State of Connecticut to enter any protest or objection until such time as the Commonwealth of Massachusetts undertook to execute said plans to the injury of the State of Connecticut and of its inhabitants, and then only in the regular course of a judicial proceeding before this Honorable Court, which has been done by filing the bill of complaint to enjoin the Commonwealth of Massachusetts from the performance of said proposals; and the plaintiff says further that any protest or objection by the State of Connecticut to the Commonwealth of Massachusetts, other than in the regular course of a judicial proceeding in this Honorable Court, duly taken, would have been highly improper as an interference with the sovereign powers of the Commonwealth of Massachusetts; and the plaintiff avers that the defense of laches cannot be interposed by the defendant against the State of Connecticut as a sovereign State and said defense, if it is a defense, does not apply.

5. Paragraph "First," page 28, beginning with the words "That the" in the 12th line and ending with the words "Ware Rivers" in the 15th line as follows:

> "That the said Commonwealth has expended large sums in preparation for diverting and storing certain reasonable amounts of the waters of the said Swift and Ware rivers,"

For the reason that said allegation of expense is immaterial, irrelevant, and impertinent.

6. Paragraph 16, page 15, beginning with the words "And further" in the tenth line and ending with the words "citizens thereof" in the fourteenth line as follows:

"And further, the defendant affirms that there is an adequate remedy at law for acts or injuries, if any such there may be, incidentally caused to the State of Connecticut or to the citizens thereof;"

Paragraph 21, pages 24 and 25, beginning with the words "and the" in the twenty-fifth line on page 24 and ending with the words "inhabitants thereof" in the fourteenth line on page 25 as follows:

"And the defendant further alleges that by virtue of the provisions of the acts of the Great and General Court of the Commonwealth of Massachusetts, hereinbefore referred to, authorizing the said diversions, due and adequate provision is made for the payment of compensation, not only to citizens of the Commonwealth of Massachusetts but also to citizens of the State of Connecticut, who may suffer any damage by reason of the said diversion, whether such damage be suffered within the Commonwealth of Massachusetts or within the State of Connecticut; and the defendant further alleges that by the common law of the Commonwealth of Massachusetts, as set forth in the leading case of Manville Co. v. City of Worcester, reported in the 138th Massachusetts Reports, at page 89, a remedy is given not only to citizens of the Commonwealth of Massachusetts but to citizens of the State of Connecticut for damages suffered within their borders by virtue of any diversion authorized by the said Commonwealth. And the defendant says that the said remedies in the courts of the Commonwealth of Massachusetts at common law and by virtue of the acts of the Great and General Court, above referred to, constitute a full, sufficient and adequate remedy at law which may be prosecuted by the State of Connecticut or any inhabitants thereof."

Paragraph "Second" on pages 28 and 29, all of said paragraph as follows:

"Second. That both the State of Connecticut and its inhabitants have an adequate remedy at law for any

> damage caused to it or to them by reason of the proposed diversion of certain of the waters of the Swift River and of the flood waters of the Ware River; that the inhabitants of the State of Connecticut, both by virtue of the common law of the Commonwealth of Massachusetts and by virtue of the acts authorizing the said diversions, may sue in the courts of the said Commonwealth for compensation for any damage which they may suffer within said State of Connecticut, and that the State of Connecticut itself may recover such damages as it may suffer by reason of the said diversion, either to its sovereign right or to any riparian rights which it may possess, by an action of law before this Honorable Court."

Paragraph "Third" on page 29 beginning with the words "a court" in the 22nd line and ending with the words "by them" in the 31st line as follows:

> "a court of equity should not grant to the complainant in the premises any specific or injunctive relief, since the complainant in its proprietary capacity as a riparian owner has an adequate remedy at law and in its capacity of *parens patriae* needs no such relief on behalf of or because of the situation of all or any of its inhabitants, all of whom are given by the legislation of the Commonwealth of Massachusetts and by the common law prevailing therein a full, adequate, and complete remedy at law for any damage or injury suffered by them."

For the reason the defendant admits in its answer the contemplated appropriation of water of the Swift River and the Ware River and further admits that said appropriation would diminish the flow of the Connecticut River at the point where it enters the State of Connecticut; which acts would constitute an invasion of a right of real property belonging to the State of Connecticut and of its inhabitants for which invasion according to the rules of law and of equity recognized and enforced both in the Commonwealth of Massachusetts and

the State of Connecticut, there is no adequate and sufficient remedy at law; and the plaintiff further says that such taking of water as is contemplated by the Commonwealth of Massachusetts can be accomplished only through the exercise of the right of eminent domain, appertaining to a sovereign power; but said right of eminent domain cannot be enforced against the State of Connecticut and its inhabitants by the Commonwealth of Massachusetts nor can either the State nor its inhabitants be compelled to accept damages against their will.

7. Paragraph 14, page 11, beginning with the words "and further" in the 29th line and ending with the words "of Connecticut" in the 35th line, as follows:

> "And further answering, the defendant says that no act or thing done or contemplated to be done by the Commonwealth of Massachusetts will in any way materially affect the flow of the Connecticut River or have any tendency to affect adversely the fertility of any land within the territorial boundaries of the State of Connecticut."

Paragraph 16, page 14, beginning with the words "and further" in the 14th line and ending with the words "citizens thereof" in the 30th line as follows:

> "And further, the defendant denies that considering the present uses of the Connecticut River and of the valley adjacent thereto, either by inhabitants of the Commonwealth of Massachusetts or municipalities therein or by inhabitants of the State of Connecticut, any interefecence with the flow of the Connecticut River or diminution in the volume of water discharged by it or carried by it, and still less such acts and the execution of such plans as are authorized by the legislation of Massachusetts to provide a domestic supply of water as hereinbefore and hereinafter set forth, will in any way adversely affect the health of the citizens of the State of Connecticut or cause to them any sickness,

suffering or discomfort, or in any way cause or make possible disease and epidemics, or that there will be in any way damage caused to the State of Connecticut or to the citizens thereof."

Paragraph 16, page 15, beginning with the words "and further" in the second line and ending with the words "that point" in the tenth line, as follows:

"and further, the defendant avers that the diversions of some of the waters of the Swift River and of the flood waters of the Ware River planned and contemplated by the defendant and described in its said legislation will in nowise cause an appreciable diminution in the flow of the Connecticut River at the state boundary, or indeed a diminution which it would be possible to determine by usual methods of stream flow measurement at that point."

Paragraph 17, page 18, beginning with the words "and the" in the 31st line and ending with the words "is authorized" in the 36th line, as follows:

"and the defendant avers that it is clearly and graphically shown by the said map how small, minute, and reasonable with respect to the whole waterflow of the Connecticut River watershed are the watersheds from which a partial diversion is authorized;"

Paragraph 17, page 19, beginning with the words "that the" in the 14th line and ending with the words "Swift River" in the 23rd line, as follows:

"that the proposed diversion of certain of the waters of the Swift River and of the flood waters of the Ware River will in nowise materially affect the flow of the Connecticut River, and that it will be impossible to determine by any practicable measurements at the point where the Connecticut River passes the boundary between the State of Connecticut and the Commonwealth of Massachusetts, any diminution in the flow

of said river caused by the proposed diversion and storage of the waters of the Ware River and of the Swift River;"

Paragraph 18, page 22, beginning with the words "and further" in the 11th line and ending with the words "inhabitants thereof" in the 16th line, as follows:

"And further answering, the defendant says that any user of said waters done or contemplated to be done constitutes a reasonable user of said waters by the Commonwealth of Massachusetts in no way inconsistent with any right or interest of the State of Connecticut or of the inhabitants thereof."

Paragraph 20, page 24, beginning with the words "that by" in the 1st line and ending with the words "of Connecticut" in the 7th line, as follows:

"that by the said diversion, as has been alleged and averred above, only the flood waters of the Ware River, as described in said act, and certain of the waters of the Swift River will be diverted, in no way causing any appreciable diminution in the flow of the Connecticut River at the point where the said Connecticut River enters the State of Connecticut."

Paragraph "Eighth," Page 31, beginning with the words "and the" in the 23rd line and ending with the words "inhabitants thereof" in the 33rd line, as follows:

"and the defendant says that it, the said Commonwealth of Massachusetts and the individual citizens thereof now make and will make after the plans now in contemplation by the said Commonwealth are carried into effect, only a reasonable and proper use of the waters of the Connecticut River and its tributaries for any and all the purposes to which the said waters are now put or are planned to be put by the said Commonwealth and its inhabitants, in nowise interfering with any vested or riparian rights of the State of Connecticut or of any inhabitants thereof."

For the reason that the defendant admits in the answer that it proposes not only to divert certain waters of the Swift River and the Ware River and to store and appropriate same, which act of appropriation is against the law of both the Commonwealth of Massachusetts and the State of Connecticut; and, consequently, the allegations that such storing and appropriation will not cause a material diminution in the flow of the Connecticut River are not material.

8. Paragraph 5, pages 5, 6, and 7, beginning with the words "answering the" in the 35th line, page 5, and ending with the word "described" in the 2d line, page 7, as follows:

> "Answering the fifth paragraph, set forth on pages three and four, of the printed bill of complaint, the defendant admits that the United States of America, acting under the authority of the Constitution of the United States, by virtue of various acts of the Congress of the United States, has assumed the care and control of navigable rivers and has placed the greater portion of the duty of exercising such control in the War Department of the United States Government and the office of the Secretary of War; but the defendant denies that any acts and things which have been in fact done or which are in fact planned by the Commonwealth of Massachusetts, complained of in said bill of complaint, constitute in any way an interference with interstate commerce by affecting the navigability of the said Connecticut River, or that, in so far as concerns any rights or interests of the State of Connecticut or of the people thereof, there is any necessity that permission should be obtained from the War Department and the office of the Secretary of War of the United States before any of the acts and things heretofore actually done or hereafter actually contemplated to be done by the Commonwealth of Massachusetts, referred to in said bill of complaint, may be lawfully done by the Commonwealth of Massachusetts, but the defendant says that whether or not such permit is necessary rests solely within the jurisdiction of Congress and of the War Department,

in so far as the powers of Congress have been delegated to that department. The defendant admits that at the time of the preparation of this answer permission from the War Department or from the office of the Secretary of War of the United States had not been obtained to do any acts actually done or contemplated to be done by the Commonwealth of Massachusetts, referred to in the bill of complaint, for which any permit may be by law required, but the defendant avers that it has filed with the Secretary of War applications for permits to make certain diversions of the waters of the Swift River and of the Ware River, which contemplated diversions are hereinafter more fully described."

Paragraph 10, pages 9 and 10, beginning with the words "and further", line 32, page 9 and ending with the words "of complaint" in line 7, page 10, as follows:

"and further answering, the defendant says that by the Constitution of the United States jurisdiction to determine questions affecting navigability of navigable waters is committed to Congress and to such officials as Congress may designate, and that Congress has so designated the officials of the War Department and has delegated the administration of its powers of supervision of navigable streams to said officials and that the determination of Congress or said officials of the War Department is conclusive as to whether or not the navigability of a navigable stream is affected adversely by any act complained of by the bill of complaint."

Paragraph 11, page 10, beginning with the words "and further" in the 14th line and ending with the words "of War" in the 22d line as follows:

"and further answering, the defendant avers that no question of whether any act done or contemplated to be done by the Commonwealth of Massachusetts has an adverse or injurious effect upon the navigability of the Connecticut River is here relevant or material, the determination of such issues having been committed by

the Constitution of the United States to Congress, which has delegated its administrative powers to the War Department and the Secretary of War."

Paragraph 17, page 20, beginning with the words "that the" in the 9th line and ending with the words "Connecticut River" in the 13th line as follows:

"that the said taking of waters will in nowise contravene any Federal law or right, nor, if it be here material, which the defendant denies, will said taking in any way impair or impede the navigability of any portion of the Connecticut River;"

Paragraph "First", page 28, beginning with the words "which diversion" in the 15th line and ending with the words "of Connecticut" in the 19th line as follows:

"which diversion will in no way seriously, appreciably, or unreasonably diminish the normal flow of the said Connecticut River or cause damage to the citizens of Connecticut or to the State of Connecticut;"

Paragraph "Fifth," page 30, beginning with the word "Fifth" in the 4th line and ending with the words "of War" in the 15th line as follows:

"Fifth. That the allegations contained in the bill of complaint in many and divers places, with respect to any interference which may be caused by the said diversion with the navigability of the Connecticut River are in nowise material, relevant, and pertinent to this bill, inasmuch as exclusive control of navigable waters and regulation of obstructions and diminutions of navigable streams has been committed by the Constitution of the United States to the Congress of the United States, which, in turn, has delegated under general rules administrative power over the said waters to the Secretary of War and the Department of War."

For the reason that the said allegations of the defendant that the Government of the United States has the regulation and control of the waters of interstate streams which are navigable and of the tributaries thereto and that applications have been made to the Secretary of War for permits to divert the waters of the Ware and Swift Rivers is immaterial and irrelevant because until such permits have been actually issued the defendant is without authority to make such diversion of water.

Also for the reason that while it is admitted therein that the navigable capacity of the Connecticut River will be obstructed and reduced by a diversion of waters from the Ware and Swift Rivers which waters would otherwise flow into and become the navigable waters of the Connecticut river, there is no allegation that an affirmative act of Congress has been obtained for such obstruction as required by Section 10 of the River and Harbor Act, approved March 3, 1899.

Also for the reason that while it is admitted in the answer of the defendant that dams will be erected in both the Ware and Swift Rivers, there is no allegation therein that the consent of Congress to the construction of such dams has been obtained as required by Section 9 of the River and Harbor Act, approved March 3, 1899.

Also for the reason that there is no allegation therein that plans and specifications therefor have been submitted to and approved by the Chief of Engineers and Secretary of War as required by Section 9 of the River and Harbor Act, approved March 3, 1899.

Also for the reason that the work proposed to be done has not been recommended by the Chief of Engineers nor authorized by the Secretary of War as required by Section 10 of the Rivers and Harbors Act, approved March 3, 1899.

Also for the reason that not only is it necessary to obtain the consent of the Government of the United States to perform any act pertaining to the waters of the United States but the consent of the State of Connecticut must also be obtained before any act can be performed which will adversely affect the navigation or navigable capacity of a navigable stream flowing through the State of Connecticut.

Also for the reason that neither Congress, the Secretary of War nor the Chief of Engineers have any power or authority to authorize the diversion of water from a navigable stream or tributary thereof for a non-navigable purpose; and particularly in the present instance there is no power or authority in either of said agencies of the Government of the United States to authorize the diversion of these waters for the purpose of a domestic water supply in another and entirely different watershed, which waters will be forever removed from navigation.

9. Paragraph 17, pages 19 and 20, beginning with the words "that all" in the 35th line, page 19, and ending with the words "navigable waters" in the 9th line, page 20 as follows:

> "that all the waters so taken or planned to be taken in order to supply the inhabitants of the city of Boston and of the Metropolitan area about said city with a necessary, adequate, and satisfactory supply of water for drinking and domestic purposes fall within the territorial limits of the Commonwealth of Massachusetts and are subject to be taken by the said Commonwealth and by the laws thereof and according to the laws in force throughout the United States of America, subject only to the right of the Federal Government to control and regulate navigable waters;"

Paragraph 17, page 20, beginning with the word "and" in the 19th line and ending with the words "domestic use" in the 24th line as follows:

"And further answering the defendant says that by the laws of the State of Connecticut the diversion of water from the watershed of the Connecticut and other rivers is permitted and authorized for the purpose of providing municipal supplies of water for domestic use;"

Paragraph 17, page 20, beginning with the words "that the" in the 29th line and ending with the words "said stream" in the 34th line as follows:

"that the laws of both said State and Commonwealth permit the diversion of waters, even of interstate streams, for the purpose of providing a water supply for the domestic use of the inhabitants of the community, and permit the diversion of said waters to a watershed beyond the watershed of said stream."

Paragraph 21, page 24, beginning with the words "and further" in the 15th line and ending with the words "of law" in the 25th line as follows:

"And further answering, the defendant says that any diversion of the flood waters of the Ware River and of such waters of the Swift River as the said Commonwealth plans to divert is within the sovereign and riparian rights of said Commonwealth and authorized by the laws of said Commonwealth and by the laws of the United States of America, and that in nowise is the State of Connecticut, as *parens patriae* or in its own right, or are the citizens of the State of Connecticut, deprived of any of their rights or property, either contrary to law or without due process of law."

Paragraph 24, pages 26 and 27, beginning with the words "and the" in the 33d line, page 26, and ending with the words "of Massachusetts" in the 15th line, page 27 as follows:

"And the defendant further avers that the Commonwealth of Massachusetts by its law and consistently with the laws of the State of Connecticut is entitled as a sovereign and as *parens patriae* to make reasonable use of the waters of tributaries of the Connecticut River

or of the Connecticut River itself within the borders of said Commonwealth, so long as it does not in any material and extraordinary way interfere with a reasonable flow within said river. And the defendant says that in no way interferes with the flow of said river or of its tributaries or contemplates any such interference or diversion of waters of the Connecticut River or of its tributaries as will in any way injure the State of Connecticut or its inhabitants or will in any way interfere with any rights which the State of Connecticut has under the Constitution of the United States or by virtue of its sovereign rights or by virtue of the laws of nations or of the laws of the State of Connecticut or of the Commonwealth of Massachusetts."

For the reason that the sovereignty of the Commonwealth of Massachusetts does not include the power to take and divert the waters of an interstate stream nor any of the tributaries thereof.

Also for the reason that the sovereignty of the Commonwealth of Massachusetts does not include the power and authority to take the property or property rights of the State of Connecticut.

Also for the reason that the sovereignty of the Commonwealth of Massachusetts does not include the exercise of the power of eminent domain over property or property rights situated without its boundaries.

Also for the reason that the sovereignty of the Commonwealth of Massachusetts does not include the ownership and control over the waters of an interstate stream, the waters thereof being the common property of all of the owners of riparian lands located within both of the states through which such stream flows.

10. Paragraph 14, pages 12 and 13, beginning with the words " and the " in the 7th line, page 12 and ending with the words " its environs " in the 8th line, page 13 as follows:

> "And the defendant further alleges affirmatively that according to certain plans for the storage, by the Commonwealth of Massachusetts of water in the valley of the Swift River, it will be possible, and it is the intention of Massachusetts to release a sufficient amount of water daily to maintain a reasonable flow in the Swift River and thus contribute to the maintenance of the flow of the Connecticut River itself. And further answering, the defendant says that under the legislation adopted by the Commonwealth of Massachusetts, so much of the waters of the Swift River as may be held back with the permission of the War Department of the United States will be stored by the Commonwealth of Massachusetts in the valley of the Swift River and will be in nowise diverted into any other place until such time as the said waters are actually required for use for drinking and other household purposes by the citizens and inhabitants of the Commonwealth of Massachusetts, at which time the waters will be transferred, as actually needed for such use, to reservoirs directly supplying the region in and about the city of Boston; that only the flood waters of the Ware River, as defined in said legislation, copies of which are hereunto annexed marked Appendix A, will be diverted by the Commonwealth of Massachusetts under the provisions of said legislation, so that no interference with, or diminution of, the flow of said last-named river during the drier seasons of the year will take place, such flood waters actually being in part stored in the Wachusett Reservoir and in part in a reservoir to be constructed in the valley of the Swift to which reservoirs such flood waters of the Ware River actually diverted will be transferred by means of tunnels and conduits, and that such flood waters will be so diverted only for a supply of water for drinking, household, and other domestic and municipal uses of the 1,900,000 human beings living in the city of Boston and its environs."

Paragraph 17, page 20, beginning with the words "that such" in the 13th line and ending with the words "inhabitants thereof" in the 19th line as follows:

> "that such uses for drinking and domestic purposes of the water so to be stored and diverted both in law and in fact constitute a reasonable and proper user of the waters of the Swift and of the Ware rivers, and they are in nowise inconsistent with any rights, interests, privileges, or immunities of the State of Connecticut or of the inhabitants thereof."

Paragraph 17, page 20, beginning with the words "and the" in the 24th line and ending with the words "riparian owners;" in the 28th line as follows:

> "and the defendant avers that the law both of the Commonwealth of Massachusetts and of the State of Connecticut permits the reasonable use of water by riparian owners if such use does not unreasonably injure lower riparian owners;"

Paragraph "Eighth", page 31, beginning with the word "Eighth" in the 13th line and ending with the words "sewage purposes" in the 23d line as follows:

> "Eighth. That by virtue of sovereign rights and by virtue of riparian rights according to the laws both of the State of Connecticut and of the Commonwealth of Massachusetts, the Commonwealth of Massachusetts and individual citizens thereof and persons owning land therein are entitled to make reasonable use of the waters of the Connecticut River and of tributaries thereof, not only for purposes of providing adequate supplies of water for drinking and household purposes, but also to make reasonable use of the said waters for drainage and sewage purposes."

For the reason that a reasonable use of the waters of an interstate stream does not include either by the law of the Commonwealth of Massachusetts or of the State of Connecticut, the right to take any of such waters for use on non-riparian land.

Also for the reason that the taking of the waters of an interstate stream is not a reasonable use thereof.

11. Paragraph 16, pages 14 and 15, beginning with the words "The defendant" in the 30th line, page 14, and ending with the words "people thereof" in the 2d line, page 15, as follows:

> "The defendant avers that the waters of the Connecticut River at the point where the river crosses the boundary between the State of Connecticut and the Commonwealth of Massachusetts could successfully dilute and carry away several times the volume of sewage now contained in the said waters at that point without in any degree or manner causing sickness, suffering, epidemic, or even discomfort to the State of Connecticut or to the people thereof,"

Paragraph 19, pages 22 and 23, beginning with the words "but the" in the 32d line, page 22, and ending with the words "any discomfort" in the 4th line, page 23, as follows:

> "but the defendant avers that said Connecticut River could successfully dilute and carry away several times the volume of sewage contained in said river at the point where it crosses the boundary between the State of Connecticut and the Commonwealth of Massachusetts without in any degree causing a menace or danger to the health of the inhabitants of the State of Connecticut or causing to said inhabitants any discomfort."

Paragraph 22, pages 25 and 26, beginning with the words "and further" in line 34, page 25, and ending with the words "of Connecticut" in line 6, page 26, as follows:

> "And further answering, the defendant avers that the waters of the Connecticut River at the point where said river passes the boundary between the State of Connecticut and the Commonwealth of Massachusetts could successfuly dilute and carry away several times the volume of sewage and other substances now contained in the said waters without in any way causing damage,

injury, or discomfort to the inhabitants of the State of Connecticut."

For the reason that the Commonwealth of Massachusetts and its inhabitants have no right to pollute the waters of an interstate stream.

12. Paragraph 24, page 26, beginning with the words "particularly denying" in the 27th line and ending with the words "said river" in the 33d line. as follows:

> "particularly denying that the State of Connecticut has either by the law of the State of Connecticut or under the laws of the Commonwealth of Massachusetts, either as a sovereign, as *parens patriae*, or as a riparian owner, any vested right to the waters of the Connecticut River or to any portion thereof above and beyond a reasonable flow within said river."

For the reason that the right to the entire flow of an interstate stream undiminished in volume and uncontaminated as to quality is a vested right in each riparian owner along such stream which is an integral part of the ownership of such lands and such rights can only be taken away by the exercise of the sovereign power of eminent domain for public use by a sovereign to whom such owners owe allegiance.

Wherefore, the State of Connecticut moves that such portions of the defendant's answer as are thereinbefore designated be stricken out.

THE STATE OF CONNECTICUT
By BENJAMIN W. ALLING,
Its Attorney-General.

ERNEST L. AVERILL,
Deputy Attorney-General.

BENEDICT M. HOLDEN,
Special Counsel.

FILE COPY

JAN 2

In the Supreme Court of the United States

OCTOBER TERM, 1929

Original No. 12

STATE OF CONNECTICUT

v.

COMMONWEALTH OF MASSACHUSETTS

IN EQUITY

MOTION TO STRIKE OUT DEFENDANT'S ANSWER — MOTION TO STRIKE OUT PART OF THE DEFENDANT'S ANSWER.

BRIEF FOR THE COMPLAINANT

BENJAMIN W. ALLING,
Attorney-General of the State of Connecticut.

ERNEST L. AVERILL,
Deputy Attorney-General.

BENEDICT M. HOLDEN,
Special Counsel.

THE CASE, LOCKWOOD & BRAINARD CO.
HARTFORD, CONN.

INDEX

MOTION TO DISMISS DEFENDANT'S ANSWER

Pars.	Subject	Page
1	General	
2	Lack of Federal Permit	34
3	Dam must be authorized by Congress (Ware River)	29, 30
4	Approval of plans necessary	29
5	Navigable capacity (Ware River)	32
6	Alteration of channel (Ware River)	34
7	Dam must be authorized by Congress (Swift River)	29
8	Navigable capacity (Swift River)	32
9	Alteration of channel (Swift River)	34
10	Massachusetts Acts void	55
11	No taking alleged	56
12	No sovereign authorized to take	57
13	Consent of Connecticut must be obtained	88
14	Invasion of sovereignty	57
15	No authority in Massachusetts to divert	55
16	Emergency and necessity of Massachusetts	65, 74

MOTION TO STRIKE OUT PORTIONS OF DEFENDANT'S ANSWER

Pars.	*Subject*	*Page*
1	Present damage need not be alleged	41, 48
2	Water policy political question	12
3	Emergency and necessity	74, 65
4	Laches	40
5	Expense	82
6	Eminent domain	56
7	Material damage	41, 48
8	Sections 9 and 10 Rivers and Harbors Act	30, 33, 34, 34, 35
9	Sovereignty of Massachusetts	46
10	Reasonable use	13, 46
11	Pollution	
12	Sovereignty	46

GENERAL HEADINGS

		Page
I.	GENERAL STATEMENT OF FACT	4– 8
II.	CAPACITIES IN WHICH THE SUIT IS BROUGHT	8– 9
III.	THE RIGHTS OF SOVEREIGNTY	10–42
IV.	RIPARIAN RIGHTS	42–48
V.	PARENS PATRIAE	48–52
VI.	HEALTH AND COMFORT OF THE CITIZENS	52–53
VII.	EMINENT DOMAIN	53–59
VIII.	NECESSITY	59–65
IX.	JURISDICTION OF THE SUPREME COURT OF THE UNITED STATES	65–82
X.	INTERSTATE COMPACTS	82–89

SUB-HEADINGS

	Page
I. GENERAL STATEMENT OF FACT	3–8
1. Interstate streams	
2. Diversion for a public use of Massachusetts	
3. Permanent diversion of waters	
4. Diversion from one watershed to another	
5. Diversion for no navigable purpose	
6. No permit obtainable from the Federal government	
7. Justified on grounds of necessity	
8. Comparative injury	
II. CAPACITIES IN WHICH THE SUIT IS BROUGHT	8–9
1. As a sovereign	8–9
2. As a lower riparian owner	8–9
3. As parens patriae	8–9
4. For the health and comfort of its citizens	8–9

	Page
III. RIGHTS OF SOVEREIGNTY	10–42
1. Sovereignties of the United States and of the State of Connecticut	10
2. Distinction between ownership of land and ownership of water	11
3. State's right to adopt policy concerning its waters	12
4. State's right as to non-navigable streams	14
5. Original power of states as to navigable streams	14
(a) Ownership of bed and banks of stream	17
(b) Trusteeship for the public	17
(c) Individual rights	18
(d) Intrastate, interstate and foreign commerce	20
6. Delegated powers of the United States	21
(a) As to interstate and foreign commerce	21
(b) Includes navigable stream and its tributaries	22
(c) Navigable capacity	24
(e) Trusteeship	27
(e) Section 9, Rivers and Harbors Act, 1899	28
(f) Section 10, Rivers and Harbors Act, 1899	31
(g) Federal permits	34
7. Reserved powers of states	36
(a) As to navigation	
(b) As to riparian rights of its citizens	
8. Laches—not applicable to sovereign	40
9. Damage need not be alleged	41

Page

IV. RIPARIAN RIGHTS 42–48
1. Use of water as an incident to ownership of land 43
2. Such use as a vested property right 43
3. Includes flood waters 44
4. Extent of rights 44
(a) Unimpaired as to quantity and uncontaminated as to quality 44
(b) Reasonable use 45
(c) Use for municipal water supply a non-riparian use 45
5. Taking waters for non-riparian use must be by eminent domain 45
6. Damage need not be alleged or proved 47

V. PARENS PATRIAE 48–52
1. Individual cannot sue the state 49
2. Due process of law 49
3. Equal protection of the law 51
4. Trusteeship for navigation, fishing and hunting 52

VI. HEALTH AND COMFORT OF THE CITIZENS 52–53
1. Pollution of the stream 52
2. Fish life 53
3. Recreation 53

		Page
VII.	EMINENT DOMAIN	53–59
	1. Taking is a legislative function	54
	2. Compensation is a judicial function	54
	3. There must be a legal taking and compensation to exercise this power	55
	4. The power is limited by state boundaries	55
	5. Powers of the United States	56
	6. No sovereign power exists to authorize taking	57
	7. Sovereign cannot be forced to accept compensation	57
	8. Effect of provision for citizens of one state to come into another and seek damages in the courts of the latter state	58
VIII.	NECESSITY	59–65
	1. Necessity for the exercise of eminent domain	59
	2. Determination of necessity is not a judicial function	60
	3. Meaning of the term "Necessity"	60
IX.	POWERS OF THE SUPREME COURT OF THE UNITED STATES	65–82
	1. Federal law	66
	2. State law	67
	3. International law	67
	4. Interstate common law	68
	5. Diplomatic settlements	72
	6. No power to legislate	72
	7. Judicial Power	73
	8. Serious magnitude of questions involved	80
	9. Equity	81

Page

X. INTERSTATE COMPACTS 82, 89

1. Constitutional provisions 83
2. What governmental rights are subject to compact 83
3. The making of a compact is a legislative act and not a judicial act 84
4. Control of the United States over terms of compact 84
5. Policy as to compacts concerning water rights 85
6. Sovereign must consent to taking 86

CONSTITUTION OF THE UNITED STATES

	Page
Article I, Section 1	83
Article I, Section 10	83
Article III, Section 1	66
Article III, Section 2	66, 73
Article XIV, Amendments to the Constitution	50, 51, 75

CONSTITUTION OF CONNECTICUT

Article I, Section 9	49

UNITED STATES STATUTES

Rivers and Harbors Act, March 3, 1899, Section 9	28
Rivers and Harbors Act, March 3, 1899, Section 10	31, 33
Act of September 19, 1890 (26 Stat., 426, 454, C. 907	32
Act of August 8, 1917 (40 Stat., 266, Sec. 5)	85
Act of April 8, 1918 (40 Stat., 515)	85
Act of July 11, 1919 (41 Stat., 158)	85
Joint Resolution of March 4, 1921 (41 Stat., 1447)	86
Act of August 19, 1921 (42 Stat., 171)	86
Joint Resolution of September 22, 1922 (42 Stat., 1058)	86
Act of January 29, 1925 (43 Stat., 796-798)	86
Act of March 4, 1925 (43 Stat., 1268)	86
Act of March 8, 1926 (44 Stat., 195)	86
Act of April 13, 1926 (44 Stat., 247, C. 129)	86
Act of July 3, 1926 (44 Stat., 831, C. 754)	86
Act of February 26, 1927 (44 Stat., 1247, C. 216)	87
Joint Resolution, March 3, 1927 (44 Stat., 1403, C. 382)	87
Act of March 2, 1929 (45 Stat., 1502, C. 520)	87
Act of March 2, 1929 (45 Stat., 1502, C. 521)	87
Act of March 2, 1929 (45 Stat., 1503, C. 522)	87
Act of March 2, 1929 (45 Stat., 1517, C. 538)	87

MASSACHUSETTS STATUTES AND REPORTS

	Page
1926, Chapter 375 (Ware River)	4, 55
1927 Chapter 321 (Swift River)	4, 55
1922, House Document 1550—Report of joint board on water supply	5, 81

TABLE OF CASES CITED

	Page
Adair *v.* United States, 208 U. S., 161	36
Aetna Mills *v.* Brookline, 217 Mass., 69	46
Aetna Mills *v.* Waltham, 126 Mass., 422	46
Agawam Canal Co. *v.* Edward, 36 Conn., 476	45
Anthony *v.* Lapham, 22 Mass., 175	45
Bank of United States *v.* Daniel, 12 Pet., 32	67
Boquillas Land & Cattle Co. *v.* Curtis, 213 U. S., 339.	18
Bradshaw *v.* Mill Co., 52 Minn., 59	18
Broder *v.* Water Co., 101 U. S., 274	18
Buddington *v.* Bradley, 10 Conn., 212	44
Cary *v.* Daniels, 46 Mass., 236	43
Cohen *v.* United States, 162 Fed., 364	27
Colburn *v.* Richards, 13 Mass., 422	45
Cummings *v.* Chicago, 188 U. S., 410	39
Donnell *v.* United States, 228 U. S., 243	16
Economy Light & Power Co. *v.* United States, 256 U. S., 113	79
Elliott *v.* Fitchburg R. R. Co., 64 Mass., 191	45
Georgia *v.* Tennessee Copper Co., 206 U. S., 230, 42, 58, 81, 89	
Gibson *v.* United States, 166 U. S., 269	22
Grand Rapids Co. *v.* Butler, 159 U. S., 87	17
Hardin *v.* Jordan, 140 U. S., 371	18
Harding *v.* Stamford Water Co., 41 Conn., 91	45
Hickok *v.* Hine, 23 Ohio State, 523	23
Hollister *v.* Union Co., 9 Conn., 435	43

Page

Home for Aged Women *v.* Commonwealth, 202 Mass., 422 14
Hudson County Water Co. *v.* McCarter, 209 U. S., 349 88

Illinois Central Railroad Co. *v.* Illinois, 146 U. S., 387 22

Johnson *v.* Jordan, 43 Mass., 234 ..... 43, 45
Johnson *v.* M'Intosh, 8 Wheat., 543 16
Jolly *v.* Terre Haute Drawbridge Co., Fed. Cases, 7441 22

Kansas *v.* Colorado, 185 U. S., 125 ..... 9, 65
Kansas *v.* Colorado, 206 U. S., 46, 9, 18, 39, 55,57,65, 83, 74 67, 68, 69, 73, 89
Kaukauna Co. *v.* Green Bay Co., 142 U. S., 254 18
Kawananakoa *v.* Polyblank, Trustee etc., 205 U. S., 349 74
King *v.* Tiffany, 9 Conn., 162 ..... 43, 44

Louisiana *v.* Mississippi, 202 U. S., 1 70
Louisiana *v.* Texas, 202 U. S., 1 84
Lynnfield *v.* Peabody, 219 Mass., 322 46

Manville *v.* City of Worcester, 138 Mass., 89 58
Martin *v.* Waddell, 16 Pet., 367 16
Miller *v.* New York, 109 U. S., 385 23
Miller *v.* Mendenhall, 43 Minn., 95 18
McCready *v.* Virginia, 94 U. S., 391 22
Missouri *v.* Illinois, 180 U. S., 208 ..... 9, 72, 84
Missouri *v.* Illinois, 200 U. S., 496 ..... 9, 72, 80, 82
Mobile Transportation Co., *v.* City of Mobile, 187 U. S., 479 16
Moulton *v.* Newburyport Water Co., 137 Mass., 163 .... 43, 45

Neaderhouser *v.* State, 28 Ind., 257 23
Nemasket Mills *v.* Taunton, 166 Mass., 540 ..... 13, 44

Page

New York *v.* New Jersey, 256 U. S., 296 ..... 9, 80, 84
New York City *v.* Pine, 185 U. S., 93 57
North Dakota *v.* Minnesota, 265 U. S., 365 9

Packer *v.* Bird, 137 U. S., 661 ..... 17, 18
Pollard *v.* Hagen, 3 How., 212 16
Pratt *v.* Lamson, 84 Mass., 275 43
Propiretors of Mills, etc. *v.* Braintree Water Supply Co., 149 Mass., 478 45

Rhode Island *v.* Massachusetts, 12 Pet., 657 .....
Rindge Co. *v.* Los Angeles, 262 U. S., 700 54

Scott *v.* Lattig, 227 U. S., 229 16
Shivley *v.* Bowlby, 152 U. S., 1 ..... 16, 17
St. Anthony Falls Water Power Co. *v.* St. Paul Water Commissioners, 168 U. S., 349 ..... 16, 17, 18, 21
Stevens *v.* Worcester, 219 Mass., 128 45
Stratton *v.* Mt. Hermon Boys School, 216 Mass., 83 47
Sweet *v.* State of New York, 129 N. Y., 316 11
Seaboard Airline Ry. Co. *v.* U. S., 261 U. S., 299 55

The Montello, 11 Wall., 411 23
The Montello, 20 Wall., 430 21
The Daniel Ball, 10 Wall., 557 23
Texas & P. R. Co. *v.* New Orleans, 40 Fed., 111 22
Thompson *v.* New Haven Water Co., 86 Conn., 597 ..... 13, 44

United States *v.* Adair, 152 Fed., 737 36
United States *v.* Burlington & H. County Ferry Co., 21 Fed., 332 23
United States *v.* Chandler-Dunbar Co., 229 U. S., 53.. 22, 59
United States *v.* Cress, 243 U. S., 316 22
United States *v.* Rio Grande Irrigation Co., 174 U. S., 690 ..... 18, 21, 24

Page

United States *v.* Bellingham Bay Boom Co., 176 U. S., 211 32
United States *v.* Beebe, 180 U. S., 343 and 353 41

Virginia *v.* West Virginia, 220 U. S., 1 67

Wadsworth *v.* Tillotson, 15 Conn., 365 44
Water Commissioners *v.* Perry, 69 Conn., 461 ..... 42, 47
Waterbury *v.* Platt Bros. Co., 76 Conn., 435 45
Wellington *v.* Rawson, 231 Mass., 189 ..... 42, 47
Willamet Iron Bridge Co. *v.* Hatch, 19 Fed., 347 23
Wilson *v.* New, 243 U. S., 332 36
Wisconsin et als. *v.* Illinois and Sanitary District, 278 U. S., 367 ..... 9, 25, 41, 64, 68, 71
Wyoming *v.* Colorado, 259 U. S., 419 69

OTHER AUTHORITIES

	Page
Blackstone's Commentary, Book 2, page 18	11
40 Cyc., 558	14
3 Ency. U. S. Reports, page 970	70
1 Farnham on Water and Water Rights, page 67, section 15	23
1 Farnham on Water and Water Rights, page 47, section 9	16
1 Farnham on Water and Water Rights, page 533	16
1 Farnham on Water and Water Rights, page 54, section 12	22
1 Farnham on Water and Water Rights, page 60, section 14	22
8 Harvard Law Review, 138	57, 59
3 Kent's Commentaries, page 439	11
3 Kent's Commentaries, page 427	18
27 R. C. L., 1371	16

In the
Supreme Court of the United States

OCTOBER TERM, 1929

Original No. 13

STATE OF CONNECTICUT

v.

COMMONWEALTH OF MASSACHUSETTS

IN EQUITY

BRIEF FOR THE COMPLAINANT IN SUPPORT OF

1 MOTION TO DISMISS DEFENDANT'S ANSWER
2 MOTION TO STRIKE OUT PART OF THE DEFENDANT'S ANSWER

PRELIMINARY STATEMENT RE MOTIONS

The two motions filed by the State of Connecticut, one a motion to dismiss the defendant's answer and the other a motion to strike out certain parts of the defendant's answer, are in the nature of demurrers to the answer as filed by the Commonwealth of Massachusetts. Both of these motions raise substantially the same questions, although in a different form. They are based on the proposition that, so far as a discussion of the questions of law involved in this case are concerned, certain facts alleged in the answer may be considered as admitted for the purpose of argument. This brief is not arranged so as to chronologically take up the several questions raised in these two motions, but rather to develop a logical argument from the beginning of the case to its end. As the different issues raised in the two motions apply to the subject discussed in the brief, attention will be called to those portions of the two motions which are pertinent.

GENERAL STATEMENT OF FACT

1. Interstate streams.
2. Diversion for a public use of Massachusetts.
3. Permanent diversion of waters.
4. Diversion from one watershed to another.
5. Diversion for no navigable purpose.
6. No permit obtainable from the federal government.
7. Justified on ground of necessity.
8. Comparative injury.

GENERAL STATEMENT OF FACT

This is an original bill in equity, filed by leave of the court, in which the State of Connecticut is the complainant, and seeks to prevent and enjoin the defendant, the Commonwealth of Massachusetts, from diverting waters from the Ware and Swift Rivers, and other rivers, all of which streams are tributaries of the Connecticut River.

The purpose of the proposed diversion is to take water from the watershed of the Connecticut River, by a system of tunnels and aqueducts, to another watershed, where it will be used to augment the supply of water for drinking and domestic purposes by the Metropolitan area comprising the city of Boston and other surrounding communities.

Massachusetts claims to act under the authority of the acts of the General Court of the Commonwealth of Massachusetts, Act of 1926, C. 375, and Act of 1927, C. 321, as set forth in the answer, pages 33 to 77.

The supply of water from the Ware and Swift Rivers, and from any other rivers which the Commission plans to take, is intended to furnish an adequate supply for a present population estimated at substantially 2,000,000. The population of the area included in the Metropolitan District so called is growing and, under normal conditions, will continue to grow to double the present population in about thirty years. Whatever the amount of water which the Commonwealth of Massachusetts plans to take under these two acts of the Great and General Court, it is considered by it, that it will be sufficient

to supply this demand, and will justify an expenditure of about $65,000,000.

The contemplated plans and the legislation enacted pertaining thereto have been under consideration for many years, and have been the subject of exhaustive study and survey by experts in water and sanitary engineering, who have made frequent reports on the situation and the problems involved. The enactments of the Great and General Court have all been predicated on these reports. (Answer, pages 16 and 17.)

The legislation on this subject is mandatory and requires that the Commission appointed thereunder "shall construct the works in substantial accordance with the plans and recommendations of the joint Board of Water Supply, needs and resources of the Commonwealth" as contained in its report to the General Court 1922, House Document 1550. Ware River Act, Answer 34. Swift River Act, Answer 50 and 51.

Many of the tributaries of the Connecticut River, including the Swift, Ware, Miller, Deerfield, Westfield and Quaboag Rivers, empty and discharge their respective waters either directly or in conjunction with the Chicopee River, into the Connecticut River; and contribute to maintain and preserve the flow of the said Connecticut River, a navigable river, which flows through a portion of the state of Connecticut, designated as the Connecticut Valley, from Springfield, Mass., to Saybrook, Conn., where it empties into Long Island Sound, an arm of the Atlantic Ocean. (Bill, pages 2, 3 and 7; Answer, pages 4, 5 and 11.)

The Commonwealth of Massachusetts threatens and intends, and has already expended large sums of money in making plans, preparing specifications, advertising for bids from con-

tractors, and doing all further acts and things usual and incident, to carry out its plans; and unless prevented from doing so will divert the waters from the tributaries of the Connecticut River herein described as the Swift River, the Ware River and other rivers from their natural flow into the Connecticut River, and convey said waters by means of conduits, aqueducts and tunnels from the watershed of the Connecticut River into the Wachusett Reservoir near the city of Worcester, in the Commonwealth of Massachusetts, in such manner that not any of the water so taken, diverted, carried away and discharged, will be again returned, discharged or released into the Connecticut River or into any portion of the watershed drained by the Connecticut River, or any of its tributaries, but will be taken away and lost forever as a part of the Connecticut River, and will be completely taken away from inland navigation. (Bill, pages 9 and 11; Answer, pages 15, 16 and 23.)

The United States is charged with the care and control of all navigable waters, and has delegated certain duties in connection with the care and control thereof to the War Department of the United States, all under acts of Congress in such case made and provided.

The action contemplated and now being carried into effect by the Commonwealth of Massachusetts requires that the plans should be first recommended and approved by the War Department and permission given to carry out such plans as have been submitted to and approved by the War Department. The Commonwealth of Massachusetts has not submitted plans to the War Department or obtained the approval of the War Department to any plans. (Bill, pages 3 and 4; Answer, page 6; Amended Answer, page 6.)

The War Department has not approved any plans and has not given permission to carry out the plans which the Com-

monwealth of Massachusetts has made for the purpose of taking away the water of the two rivers in question. (Amended Answer, filed November 4, 1929.)

The State of Connecticut and its citizens are without adequate relief or remedy at law for the injury which would result from the acts and conduct complained of; and unless restrained by injunction the Commonwealth of Massachusetts will proceed to carry out its plan and take water from the Connecticut River watershed, and not return the water so taken after it has been used, to the watershed from which it is originally taken. (Bill, page 13; Answer, page 23.)

Massachusetts sets up among other things:

(a) The existence of an emergency within Massachusetts which constitutes a justification for the proposed taking. (Answer, pages 16, 17, 23, 27 and 28.)

(b) That the waters to be taken fall within the territorial limits of the Commonwealth of Massachusetts and are subject to be taken by such Commonwealth, subject only to the right of the Federal Government to control and regulate navigable waters. (Answer, pages 19 and 20.)

(c) It denies that property or persons situated in the Connecticut Valley are injuriously affected by any of the acts complained of, and claims that only a small quantity of certain waters will be taken at present. (Answer, pages 9, 11, 12, 15, 19 and 29.)

(d) That the taking of the waters of the Ware River and of the Swift River has been definitely contemplated by the Commonwealth of Massachusetts for more than thirty years. (Answer, page 16.)

(e) That a comprehensive study of the water supply problem of the Metropolitan District of Boston has been going on for more than a century. (Answer, page 21.)

(f) That it proposes to proceed with the work because of the pressing emergency confronting the Commonwealth of Massachusetts with respect to providing a suitable supply of water for domestic purposes. (Answer, paragraph 20, page 23.)

(g) That the State of Connecticut or any of its citizens who may be damaged can recover any damages suffered by virtue of any diversion authorized by the Commonwealth of Massachusetts, by recourse to the courts of Massachusetts, and that therefore the State of Connecticut and its citizens have an adequate remedy at law. (Answer, paragraph 21, pages 24, 25, 28 and 29.)

(h) That serious injury will result to the citizens of Massachusetts if the diversion is prohibited.

(i) That the diversion is but a reasonable use of the waters of the Swift and Ware Rivers by the Commonwealth of Massachusetts.

(j) Laches.

(k) That all the acts done or contemplated to be done are in obedience to and in compliance with the provisions of enactments of the General Court of Massachusetts. (Answer, pages 16, 17, 18 and 19.)

II. CAPACITIES IN WHICH THE SUIT IS BROUGHT

1. As a sovereign.
2. As a lower riparian owner.
3. As parens patriae.
4. For the health and comfort of its citizens.

CAPACITIES IN WHICH SUIT IS BROUGHT

The State of Connecticut brings this action upon four grounds which have been approved by this court in a number of cases;

First, as a sovereign charged with maintaining the policies of its government in relation to its lands and flowing waters;

Second, as a riparian owner upon an interstate stream;

Third, as *parens patriae* having the responsibility for the guardianship and protection of its people both in general as to navigable waters and in particular as to a large proportion of its inhabitants who own rights in this interstate stream of the same character as does the state itself;

Fourth, for the protection of the health and comfort of its citizens, or a large proportion of them.

Missouri *v.* Illinois, 180 U. S., 208, 241; 200 U. S., 496, 519.
Kansas *v.* Colorado, 185 U. S., 125, 141; 206 U. S., 46, 80.
New York *v.* New Jersey, 256 U. S., 296, 302.
North Dakota *v.* Minnesota, 265 U. S., 365, 372.
Wisconsin *v.* Illinois, 278 U. S., 367-409.

It is conceded by the Commonwealth of Massachusetts (Brief, Massachusetts, page 49) that Connecticut has a standing, as *parens patriae,* to raise for the determination of this court issues with respect to this diversion and the right to sue in behalf of its own proprietary interests and the general welfare of its people.

III. RIGHTS OF SOVEREIGNTY

1. Sovereignties of the United States and of the State ~~ship of water~~ 11
2. Distinction between ownership of land and ownership of water 10
3. State's right to adopt policy concerning its waters 12
4. State's right as to non-navigable streams 14
5. Original power of states as to navigable streams .. 14
   (a) Ownership of bed and banks of stream 17
   (b) Trusteeship for the public 17
   (c) Individual rights 18
   (d) Intrastate, interstate and foreign commerce 20
6. Delegated powers of the United States 21
   (a) As to interstate and foreign commerce 21
   (b) Includes navigable stream and its tributaries 22
   (c) Navigable capacity 24
   (d) Trusteeship 27
   (e) Section 9, Rivers and Harbors Act, 1899 .. 28
   (f) Section 10, Rivers and Harbors Act, 1899 31
   (g) Federal permits 34
7. Reserved powers of states 36
   (a) As to navigation .....
   (b) As to riparian rights of its citizens .....
8. Laches—not applicable to sovereign 40
9. Damage need not be alleged 41

1. *Sovereignties of United States and State of Connecticut*

There are two sovereigns or quasi sovereigns who have an interest as such in the waters of the Connecticut River flowing through the State of Connecticut; one, is the United States

under its power to regulate and control interstate and foreign commerce, and the other, the State of Connecticut.

In discussing rights to flowing waters, we will commence with the powers of the state as they existed originally; *second,* the delegation of power to the United States, its scope and limitations; and *third,* the powers which still remain in the State after such delegation.

2. *Distinction between ownership of land and use of water*

In discussing rights to flowing waters, one distinction must always be kept in mind. Water as such must be considered apart from the channel, bed and banks over, along or through which the water flows.

In the discussion of questions arising as to the use of water with the many purposes to which it is subject, this fundamental distinction is very often lost sight of.

As to water itself, whether of navigable or a non-navigable stream, there cannot be absolute ownership of the water. The only interest which any one soverign or subject has in the water is the right to the beneficial use of the water as it naturally flows. This right is an usufruct.

> Blackstone Com., Book 2 Page 18.
> 3 Kents Com., Page 439.
> Sweet *v.* State of New York, 129 N. Y., 316.

This right to the beneficial use of water is divided between a public use, jus publicum, and the right of the individual, or jus privatum. Each is dependent upon some sort of ownership in the bed and banks of the stream through which the water flows.

3. *State's right to adopt policy covering its waters*

One problem of a government having streams within its domain is to determine upon some policy as to the relative rights of the individuals who own property along the banks of the streams, because it is the ownership of the land through which the stream flows which determines the rights in water.

Massachusetts and Connecticut, two of our earliest states, substantially adopted the common law doctrine of the English government as to water rights.

On the other hand the western states, with a vast amount of arid land, decided that for the best interests of their states as a whole, a different doctrine should be established and an allocation of the waters made based upon priority of appropriation for use of the waters in the reclamation of arid lands.

It must be conceded that any state has the right to determine for itself which of these doctrines, in whole or in a modified form, is to be adopted as the law of that particular state. When taken—this action cannot be modified or changed by the United States or any power other than the State which determines the rule.

In *paragraph 2* of the *complainant's motion to strike out certain parts of the defendant's answer* (pages 6 to 8) portions of Defendant's Answer are quoted. These portions of the answer set forth; in substance that the State of Connecticut and its citizens are not entitled to the use of the flood waters of the Connecticut River as they are supplied through the tributaries, but only to some unknown portion of the waters which flow through the stream during the course of the year, called by the Commonwealth of Massachusetts "the normal flow of the stream"; and it is further claimed that the State of Connecticut and its citizens would be better off without these flood

waters, and that because they would be better off, and because they are not entitled to them, the Commonwealth of Massachusetts has the right to take them.

The complainant has moved to strike out these portions of the answer, because under the law of the two states, all persons having a right to the use of flowing waters are entitled to all of the water which naturally flows through the stream, whether it be at the time of flood or at the time of drought, or at some intermediate season of the year. In Connecticut our Supreme Court has specifically called attention to the rights of riparian owners to flood waters as such, while in Massachusetts the courts include the flood waters as part of the natural flow of the stream.

> Thompson *v.* New Haven Water Co., 86 Conn., 597.
> Nemasket Mills *v.* Taunton, 166 Mass., 540, 544.

The states and the citizens thereof, being entitled to all of the waters of the stream as they flow, it is for the states, through their legislative departments, to determine as a state policy if any portion of the waters of a stream, whether flood waters or not, is to be allowed to be taken for any other purpose than a riparian use.

Paragraph 10 (page 27-29) of the *complainant's motion to strike out certain parts of the defendant's answer* (page 30) includes a quotation from the defendant's answer, wherein it is alleged that the State of Connecticut, either as a sovereign, as *parens patriae*, or as a riparian owner, has no vested right to the waters of the Connecticut River or to any portion thereof above and beyond a reasonable flow within said river. As hereinbefore stated, the reasonable flow of any stream includes all of the water which naturally flows through it. It follows that the allegation that Connecticut has no interest or right in any waters beyond this point is meaningless and should be stricken out.

On the other hand, if it is meant by this paragraph that Connecticut and its citizens have no vested right in any of the waters of the stream, then this statement is so contrary to the rule of law obtaining in both the Commonwealth of Massachusetts and the State of Connecticut, under the common law doctrine of flowing waters, that it should be stricken out as an incorrect statement of the law obtaining in both states.

4. *State's right as to non-navigable streams*

The common law doctrine provides that the riparian owners own to the thread or middle of the stream and as such owners of riparian land are entitled to the water as it is wont to flow, undiminished as to quantity and unimpaired as to quality. As to the waters of these streams or the riparian lands which carry with them the beneficial use of the water, the state has no more interest than it has in any other property in the state owned by individuals.

> "The state has no ownership in any part of unnavigable streams, nor any control over them, except such as it has in all parts of its domain for governmental purposes".
>
> (See 40 Cyc., 558;
> Home for Aged Women *v.* Commonwealth, 202 Mass., 422.)

This governmental purpose is the right to take property for a public use by the exercise of the power of eminent domain and it is only in this way that the soverign can acquire for itself or for any one else the property rights in riparian lands and the use of water flowing through them.

5. *Original power of states as to navigable streams*

The original states of the Union secured their governmental powers from Great Britain in two successive ways. *First,* by

grant of royal charters, and *second*, as a result of the Revolutionary War. The sovereignty secured by charter was not an absolute one so far as navigable waters were concerned. The powers of the Crown had been limited by the provisions of *magna charta* and subsequent rights conceded to the people. The powers of the government as such and the superior conceded rights of the individuals comprising that government were differentiated. The life of the government was predicated upon the due respect and jealous safeguarding of the rights to which the people were entitled. Judge Koonce, O. C. E., in his lecture at the Engineer School at Fort Humphreys, Virginia, April 23, 1926, expressed the powers of the Crown as follows:

> "Thereafter, title to the land and water in the space between high water mark on each side of the river was vested in the King merely as a prerogative right incident to the power of government, and was held by him in trust for the public easement, or rights of navigation and fishery, the power to regulate and control which was vested in Parliament as representing the people. Upon the settlement of the American Colonies these rights passed to the grantees in royal charters in trust for the communities established."

To this might also be added the obligation of the Crown to recognize and protect the right of riparian ownership in the individuals along the streams. The colonies succeeded to both the powers of the Crown and of Parliament. In their set-up of government, the Colonies also differentiated these powers but in a substantially different manner. To the legislatures were given the powers of the Crown, but the powers reserved to the people were not entrusted to any representative body, but reserved for their own determination and control. Hence the so-called Bill of Rights which is a part of the several state constitutions and which appears as a part of the constitution of the United States. It is a most significant fact that it was by the assurance of the passage of the first ten amendments

to the Federal Constitution which set forth these rights, that it was possible to secure the adoption of the Constitution as originally prepared. It was not enough for the colonies or states to be assured that these rights were inherent; they demanded and secured a positive declaration to that effect.

The successful conclusion of the Revolutionary War transferred to the several colonies all of the powers and prerogatives of the English Government.

1 Farnham on Water and Water Rights, page 47, sec. 9.
27 R. C. L., 1371 and cases cited.
Pollard *v.* Hagan, 3 How, 212.
St. Anthony Falls Co. *v.* St. Paul, 168 U. S., 360.
Shively *v.* Bowlby, 152 U. S., 1.
Johnson *v.* M'Intosh, 8 Wheat., 543, 595.
Martin *v.* Waddell, 16 Pet., 367, 408-410, 414.

The colonies' governmental interest in the waters of navigable streams assumed that of a trusteeship for the benefit of the people as a whole.

1 Farnham on Waters, page 533.
Mobile Tr. Co. *v.* City of Mobile, 187 U. S., 479.
27 R. C. L., 1371 and case.
Pollard *v.* Hagan, 3 How, 212.
Scott *v.* Lattig, 227 U. S., 229.
Donnell *v.* U. S., 228 U. S., 243.

As we have before indicated the State as a sovereign has no ownership in the water itself. There is, however, the right in the general public of the state, common to all of its people, to use the water of all streams where it is possible, for the purpose of navigation. If any stream is in fact susceptible of being used for the transportation of persons or the transportation of merchandise the water of such stream becomes charged with the use of the general public of that State for such purposes.

(a) *Ownership of bed and banks of stream:*

To insure this use for the benefit of all its people, the State, to this extent, holds the title to the land underneath such navigable water to high water mark on both sides of the stream. In addition to insuring the use of the water of these streams, designed by nature to furnish a means of water transportation, the title in the state also permits of the development of navigation by work upon the land lying underneath these waters. So that there is in the hands of the state the governmental function of maintaining the navigable streams which in fact are found to be navigable and their development for the purpose of navigation to their fullest extent, or to their navigable capacity.

This title which is in the state to land lying underneath navigable waters gives the state no proprietary interest in such lands. It is only a prerogative right to protect, preserve and develop navigation.

St. Anthony Falls Co. *v.* St. Paul, 168 U. S., 358-365.
Shively *v.* Bowlby, 152 U. S., I.

This right of navigation simply means that a method of transportation by water is a common right to all the citizens of the state. The title in the state is likened to the interest of the state in its land highways which is that of an easement.

Packer *v.* Bird, 137 U. S., 661, 667.
Grand Rapids Co. *v.* Butler, 159 U. S., 87.

(b) *Trusteeship for the public:*

The title which the state has in the land underneath the water of navigable streams is that of a trustee. It holds the land and incident to such title the use of the waters of such stream in trust for the benefit of the general public to use such

waters primarily for navigation. In other words, before any other interest in the use of such waters is to be exercised such use must be secondary to the public right of navigation and such use must be exercised in such a manner as to not destroy or seriously impair the public right of navigation. This title being in the state as a trustee for all of its people, it cannot be alienated without their consent.

Bradshaw *v.* Mill Co., 52 Minn., 59.
Vol. 3, Kent Com., 427.
Miller *v.* Mendenhall, 43 Minnesota, 95, 101, 104.

(c) *Individual rights:*

The same principle is true in the case of the individual as in the case of the state. There is likewise no individual ownership of running water. It is merely such rights as the individual may have to its beneficial use. These rights follow and are appurtenant to the ownership of the land over which the stream flows or the land adjoining the stream. These rights are known as riparian rights and the owners as riparian owners have the proprietary interests and the extent of these property rights are determined by the common law of the state in which the stream is located.

St. Anthony Falls Co. *v.* St. Paul, 168 U. S., 358-365.
Packer *v.* Bird, 137 U. S., 661, 667, 669-671.
Kaukauna Co. *v.* Green Bay Co., 142 U. S., 254, 272.
Hardin *v.* Jordan, 140 U. S., 371, 382.
Kansas *v.* Colorado, 206 U. S., 96, 97.
U. S. *v.* Rio Grande Irrigation Co., 174 U. S., 690, 704, 705.
Broder *v.* Water Co., 101 U. S., 274, 276.
Boquillas Land & Cattle Co. *v.* Curtis, 213 U. S., 339.

The States of Connecticut and Massachusetts are common law states and the common law rule as laid down by Chancellor Kent is as follows:

> "Every proprietor of lands on the banks of a river has naturally an equal right to the use of the water which flows in the stream adjacent to his lands as it was wont to run *(currere solebat)* without diminution or alteration. No proprietor has a right to use the water to the prejudice of other proprietors above or below him unless he has a prior right to divert it or a title to some exclusive enjoyment. He has no property in the water itself, but a simple *usufruct* as it passes along. *Aqua currit et debit currere et currere solebat* is the language of the law. Though he may use the water as it runs over his land as an incident to the land, he cannot unreasonably detain it or give it another direction, and he must return it to its ordinary channel when it leaves his estate."

The uses which the riparian owners might make of the water as it passes by their land included the right to use a reasonable portion of it for domestic purposes, the right to bathe in the stream and the right to use the water for manufacturing purposes. This last right, however, was predicated upon compensating the riparian owners along the stream in the event that it was either held back from or flooded the land of other riparian owners.

All of these uses, which attach to the riparian lands, contemplated the substantial return of the water used to the stream for the further use by other riparian owners below. There was no right attached to any riparian owner to so divert the waters of the steam that the water would be permanently withdrawn from the stream and the lower owners forever deprived of the use of such water.

Riparian rights, attaching to non-navigable streams, are of primary importance because by the common laws of both Connecticut and Massachusetts, the riparian owners owned to the thread of the stream. In the case of navigable streams, as

we have already shown, the primary use of the water was for the common purposes of navigation. In such streams the use by the riparian owners, while it existed, was always subject to the common right of the general public to navigate the stream and the right of the state to improve the navigation of the stream. Yet subject to such rights, the riparian owners still possessed the same rights which they did upon non-navigable streams.

The rights in the riparian owners are vested rights of property, which under the constitution of the states, cannot be taken from them except for a public purpose of the state in which they are located, and in all cases by due process of law which must provide compensation be made for the property rights taken.

To sum up, the states, before the United States was formed, possessed certain title to the bed and banks between high water mark of all its navigable streams. As an incident to this title, the state was entitled to the use of the water flowing therein for navigation purposes. The state for the benefit of all of its people held this land in trust for its people, a trust which was not alienable. The trust consisted in the maintenance of navigation by all of its citizens of its navigable streams and the right to improve such navigation should it so desire.

(d) *Intrastate, interstate and foreign commerce:*

The state also had the right to regulate and control all commerce over these navigable streams between the state and other states and between the state and foreign land. The state also had the obligation and duty to only use the water in these streams for navigation purposes but to make certain that any surplus water not needed for navigation purposes should be at the disposal of the riparian owners for such beneficial use as they were entitled to.

6. *Delegated powers of the United States*

The framers of the Constitution of the United States recognized the restricted powers of the sovereign states, i. e., restricted as to each other, although unlimited within their own boundaries, and each state relinquished certain of its powers over the use of its navigable waters, by granting to the United States the power to regulate interstate commerce.

(a) *As to interstate and foreign commerce:*

As an incident to this power was the power to regulate, preserve and protect the navigability of the waters located within the several states for the use of the general public for interstate and foreign travel and commerce.

Under this delegated power, the United States acquired no title to the water, the bed nor the banks of navigable streams. Consequently, no power is lodged in any agency of the federal government to authorize directly or indirectly the taking away or diversion of any portion of the waters of navigable streams nor the disposition of any of the land under them. The waters may be used for some navigable purpose by or under the authority of the federal government but for no other purpose.

The powers vested in the United States have been repeatedly described as the duty to preserve and protect the navigability or navigable capacity of these instrumentalities of interstate and foreign commerce.

> United States *v.* Rio Grande Irr. Co., 174 U. S., 690.
> St. Anthonys Falls Co. *v.* St. Paul, 168 U. S., 349.
> The Montello, 20 Wall, 430.

This power has also been expressed as the power of "regulating and improving navigation".

Gibson *v.* U. S., 166 U. S., 269.
U. S. *v.* Chandler-Dunbar Co., 229 U. S., 53.
U. S. *v.* Cress, 243 U. S., 316.
McCready *v.* Virginia, 94 U. S., 391.
Illinois Central Railroad Co. *v.* Illinois, 146 U. S., 387.

Also as the protection and encouragement of interstate commerce.

1 Farnham on Water & Water Rights, page 54, sec. 12.
Jolly *v.* Terre Haute Drawbridge Co., Fed. Cases, No. 7441.
Texas and P. R. Co. *v.* New Orleans, 40 Fed., 111.

"The authority is given to Congress for the purpose of aiding, and not destroying, navigation and commerce; so that, although authority over the stream is absolute in execution of the trust imposed upon it, whatever obstructions it authorizes must be for the purpose of improving the navigation of the stream, or of facilitating commerce."

1 Farnham on Waters & Water Rights, page 60, sec. 14.

(b) *Includes navigable stream and its tributaries:*

The Ware and Swift Rivers are tributaries of the Connecticut River, a navigable stream, and some of their waters are concededly essential to present navigability of the Connecticut. This being so, makes their waters "navigable waters of the United States."

The fact that the War Department has already assumed jurisdiction over these waters and is prepared to limit the proportionate part of these waters which it will allow to be diverted, is strong evidence that this Department considers them "navigable waters of the United States". Otherwise, the United States would have no jurisdiction over them.

Navigable water of the United States has been held to mean:

> "A river, or other waterway, constitutes a navigable water of the United States, within the meaning of the said Acts of Congress, when it forms, by itself or by uniting with other waters, a continuous highway over which trade and travel is or may be conducted between the states themselves, or between the states and foreign countries."
>
> The Daniel Ball, 10 Wall, 557.

It has also been defined to mean:

> "Such waters are those which form, in their ordinary condition, by themselves or in connection with others, highways over which commerce is, or may be carried on with other states or foreign nations in the customary modes in which such commerce is conducted on water."
>
> 1 Farnham on Water & Water Rights, 67, sec. 15.
> U. S. *v.* Burlington & H. County Ferry Co., 21 Fed., 332.
> The Montello, 11 Wall, 411.
> Willamet Iron Bridge Co. *v.* Hatch, 19 Fed., 347.
> Miller *v.* N. Y., 109 U. S., 385.
> Neaderhouser *v.* State, 28 Ind., 257.
> Hickok *v.* Hine, 23 Ohio State, 523.

From these definitions it is evident that the stream in question, of itself, may not be navigable, but if it contributes to other water so that a channel of commerce is afforded for trade and travel between states or within the states, the water then becomes "navigable water of the United States".

All the tributaries of a navigable stream are within the class designated by our Courts as "Navigable Waters", under the care and regulation of the United States as such.

This principle has been recognized by the War Department

in this case, where it has limited the diversion to be allowed from the stream.

The duty of the War Department is to protect and promote navigation—not to say how far it can be tampered with before injury results.

This principle has also been approved by the Supreme Court of the United States.

U. S. v. Rio Grande Irrigation Co., 174 U. S., 690.

(c) *Navigable capacity:*

A number of the cases involving the powers of the United States concerning navigable waters have mentioned the term "Navigable capacity". A distinction also appears in the Rivers and Harbors Act of 1899 between obstruction to navigable capacity, which can only be authorized by the affirmative act of Congress and navigability, which is to a considerable extent within powers of the Secretary of War acting on recommendation of the Chief of Engineers.

There is no certain definition of the term, "Navigable capacity". Although the terms have been employed together to a considerable extent, it hardly seems probable that the terms "navigable capacity" and "navigability" are synonomous.

One of the powers which the United States has always claimed and actually exercised for a great many years has been the power to improve the navigability of streams under its jurisdiction. So that a stream partially navigable in the first instance may be improved by the Government and become wholly navigable; or where a stream is navigable only a portion of the year, by the improvements made by the United States or by the states it may become navigable during the whole year. The

improvements authorized by Congress originally were confined largely to dredging and deepening the channels. Recently, studies have been made by the United States for the improvement of navigation by a control of the flow of the stream. The Government is now expending large sums of money in surveys, having as their objective the use or harnessing of the flood waters so as to improve the flow of the streams during dry periods and periods of injurious floods.

From this it seems that it is rather the potential or possible capacity for navigation which can be obtained by artificial improvements which should determine the navigable capacity of the stream rather than to say that the navigability as it exists should be the test.

As an example, if a stream be navigable for six months in the year, as nature has allocated the water, and not navigable during the other six months, but it should be found that by storing the surplus waters during the six months of plenty and permitting these stored waters to flow down the stream during the six months of drought, a continuous navigation of twelve months in the year could be obtained, it seems a reasonable claim that the navigable capacity of such a stream would be twelve months in the year instead of six months. In other words, navigable capacity is to be determined by the total amount of water available, so controlled as to provide the maximum of navigability.

The construction placed upon this provision by the Supreme Court of the United States in the recent case of *Wisconsin et al. v. Illinois and Sanitary District of Chicago* (278 U. S., 367) has been to place in the hands of the Secretary of War, acting on the recommendation of the Chief of Engineers, the determination in the particular case of what constitutes an unreasonable obstruction. In that case it will be recalled that on two different

occasions the Secretary of War decided that the diversion of 4,167 cubic feet per second, 8,500 cubic feet per second respectively from the waters of Lake Michigan was not an unreasonable obstruction to navigable capacity. The Court, however, found that as insofar as the diversion authorized by the Secretary of War was not for a navigable pupose, that there was no authority in the Secretary of War to grant a permit for such diversion. The Court further stated (page 417):

> "The normal power of the Secretary of War under Section 10 of the Act of March 3, 1899, is to maintain the navigable capacity of Lake Michigan and not to restrict it or destroy it by diversions."

In other words, the diversion of water from any navigable stream for a purpose other than navigation is beyond the powers of the Secretary of War because of necessity it restricts navigable capacity.

The states having delegated to the United States the power to regulate and control interstate commerce, it necessarily follows that all the navigable water of the United States, which is susceptible to use for water transportation can be used by the United States to its fullest extent for navigable purposes. It may use the water within the same watershed, in the same stream or it may divert the waters or a portion of them from one stream into another; the only requirement is that some navigable purpose is to be served by this use of the water.

If the United States believes that the commerce will be best taken care of by the development of a new line of water transportation, it may use any navigable waters of the United States to bring this about.

Where, however, there is water in a non-navigable stream which has not been a contributor to the navigability of a

stream, the United States cannot obtain the use of this water except by the exercise of the power of eminent domain and the consequent payment of damage to the individual owners of the land bordering such non-navigable streams. This is a taking of private property for which the owner is entitled to compensation.

Cohen *v.* United States, 162 Fed., 364.

There is no ownership in the waters of any stream navigable or non-navigable in the United States. The most that the United States receives through the delegation of power to control interstate commerce is the use of the water to which the people of several states had in common to use such waters as a means of transportation and trade.

(d) *Trusteeship:*

To protect this common right before the adoption of the Constitution, the obligation to preserve and protect the common right of navigation and fishing in navigable water rested in the government of the states as trustees for the benefit of the general public.

By the adoption of the Constitution so far as these navigable waters were available or could be made available for any ~~state~~ interstate or foreign trade or travel the trusteeship to preserve and protect such water transportation was delegated to the United States and thereupon the United States became charged with the same trust which had been lodged in the states themselves. Such being the relationship between the United States government and the states, it is evident that neither the United States or any of its departments have the right to authorize, permit or allow any of the waters to be used or appropriated to any other use than that for which the trust is created.

(c) *Section 9, Rivers and Harbors Act, 1899:*

The Congress of the United States in drafting the Rivers and Harbors Act, approved March 3, 1899, has recognized the principles which we have thus far set forth in this brief in both sections 9 and 10 of that Act.

Section 9, so far as applicable to this case, provides as follows:

> "That it shall not be lawful to construct or commence the construction of any . . . dam . . . in any . . . *navigable river, or other navigable water* of the United States until the consent of Congress to the building of such structures shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of War."

The first requirement of this section is that a dam is to be constructed. There is nothing in this section which provides that the proposed dam shall in any way affect present navigation or navigable capacity. The only requirement is that it shall be a dam, and in this case it is conceded that a diversion dam is to be constructed in the Ware River and two dams for the impounding of water in the Swift River. This brings these ~~two~~ structures squarely within the terms of this section.

The second requirement is that the dam is to be constructed in any "navigable river, or other navigable water of the United States". For the purposes of this argument, it is conceded that the Ware and Swift Rivers are not "navigable rivers". So that to come within the terms of this section the waters of the Ware and Swift must be "other navigable water of the United States".

We have already discussed the meaning of the term "other navigable waters of the United States" under the heading (b)

where it is claimed that a navigable stream includes of necessity the waters of its tributaries. The action of the War Department as set forth in the amended answer filed by the Commonwealth of Massachusetts is based upon the fact that the dams to be erected in the Swift River will have an effect upon the present navigability of the Connecticut River unless the Commonwealth of Massachusetts provides for the release of more water than its legislation provides for; and it is conceded by the War Department that unless it does so there would be grounds for federal interference in the operation of these dams. The only theory upon which the War Department will have any jurisdiction in this matter is that the navigable waters of the United States are in some way being affected by the construction of these dams. The complainant claims that it is not within the province of the War Department to determine how far the Commonwealth of Massachusetts may interfere with the navigability of a stream where the interference is to be accomplished by the construction of a dam; that under this section of the Rivers and Harbors Act it is only by an act of Congress that a dam can be built in any waters which are navigable in themselves or which contribute to the navigability of a stream to which they are tributary.

In the *complainant's motion to dismiss the defendant's answer* it is claimed in *paragraphs 3 and 4* (page 6) and *paragraph 7* (page 7) that it does not appear in the answer that any act of Congress has been passed authorizing the construction of a diversion dam in the Ware River or any dams in the Swift River; that the waters of these two rivers, forming a part of the navigability of the Connecticut River, and being the waters of the United States, such fact must affirmatively appear in the answer, if it is intended on the part of the Commonwealth of Massachusetts to rely upon some federal authority for making a diversion of the waters of these two streams.

It is also claimed in the *third paragraph* of the *motion to dismiss the answer* (page 6) that the second portion of section nine of the Rivers and Harbors Act provides that plans for such structures must be submitted to and approved by the Chief of Engineers and the Secretary of War; and that nowhere does it appear that any plans have been submitted to or approved by either or both of these officers of the government. The complainant claims that until such action has been taken the Commonwealth of Massachusetts cannot set up any federal authorization for this diversion as a defense.

Under this section the questions as to whether it does or does not, or to what extent it may affect navigation, are left in the hands of Congress. All that the Chief of Engineers and the Secretary of War can do is to receive plans and approve them. The authority to allow the construction of the dams rests with Congress, and it is Congress alone which can authorize such construction.

Since the drafting of the motion to dismiss defendant's answers, and the motion to strike out part of the defendant's answer, the defendant has amended its answer by setting forth the action of the Secretary of War upon applications for permits which were filed by the defendant. Under this section of the law these amendments to the answer do not add to the defense, inasmuch as they show upon their face that Congress has never approved or authorized the construction of any diversion dam in the Ware River or any dams for impounding water in the Swift River.

It appears in *paragraph 8* of the *complainant's motion to strike out certain parts of the defendant's answer* (pages 20 to 24) that there are numerous allegations in the answer concerning activities which it is claimed may be performed by the officials of the federal government, but nowhere is there any statement showing that under the provisions of Section 9 of

the Rivers and Harbors Act of 1899 has Congress authorized the construction of any dams in either the Ware or the Swift Rivers; or that any plans have been submitted to or approved by either the Chief of Engineers or the Secretary of War. The complainant therefore asks that these immaterial and irrelevant allegations be stricken from the answer as they fail to show legal justification to make these diversions.

(f) *Section 10, Rivers and Harbors Act, 1899:*

Section 10 of the Rivers and Harbors Act of 1899 may be divided into three parts. The first sentence provides as follows:

> "That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of the waters of the United States is hereby prohibited;"

Recognizing the principle that the total water in the watershed which contributes to the volume of water flowing through a navigable stream is the condition which must be preserved by the United States for the purpose of interstate and foreign commerce, Congress has reserved to itself the determination of what action it will take should the navigable capacity of the navigable stream be jeopardized. It has expressly withheld from its administrative officers, the Secretary of War and the Chief of Engineers, any power to authorize the disposal of any of these waters, or by agreed non-interfence or other means allow any of the waters which form a part of the navigable capacity of a stream to be removed therefrom. Such removal must not be permitted without an affirmative act of Congress.

If there is any distinction between the "navigable waters of the United States" as used in Section 9 and the term "waters of the United States" this section at least applies to the waters of the Ware and Swift Rivers if they have any "navigable capacity".

It seems fair reasoning to assume that any tributary of a navigable stream has some navigable capacity. Very few streams would supply sufficient water to be classed as navigable streams without the aid of tributaries. Consequently each tributary has a capacity and by furnishing its water makes possible the navigability of the main stream.

Therefore, it is logical to say that any interference with the flow of the tributary of a navigable stream is an obstruction to the navigable capacity of that stream, as well as the navigable capacity of the main stream.

This portion of section 2 of the Rivers and Harbors Act of 1899 originally provided that the creation of any obstruction not affirmatively authorized by law to the navigability and capacity of any of the waters of the United States was prohibited. Under this phraseology it was held that the authority of the state was sufficient to interfere with the navigable capacity of a navigable stream.

> U. S. *v.* Bellingham Bay Boom Co., 176 U. S., 211, Act of 1890.

It was this decision which was responsible for the change in the wording of the statute.

In *paragraph 5* (page 6) and *paragraph 8* (page 8) of the *complainant's motion to dismiss the defendant's answer* it is claimed by the complainant that nowhere in the answer does it appear that Congress has affirmatively authorized a diversion of the waters of the Ware and Swift Rivers, which are tributaries of the Connecticut River, a navigable stream. Inasmuch as the War Department has taken cognizance of these diversions, and has specifically found that the navigable capacity of the Connecticut River is affected by the proposed diversions, the complainant claims that it is necessary, if federal authority

is to be set up as a defense to this action, that the answer must show some affirmative act of Congress in order to constitute a valid defense to this action. This motion applies with equal force to the answer as amended, as there is nothing showing any affirmative act of Congress set up in the amended answer.

In *paragraph 8* of the *complainant's motion to strike out certain parts of the defendant's answer* (pages 20 to 24) there appear a number of quotations from the defendant's answer, in none of which is there any information that Congress has affirmatively authorized the proposed diversions from these two rivers. Therefore the quoted portions of the answer are immaterial and irrelevant as a defense to this action.

It is conceded that the second portion of section 10 has no application to this case. The third part, so far as it is applicable to this case, reads as follows:

> "And it shall not be lawful . . . . . in any manner to alter or modify . . . . . the capacity of . . . . . the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

It is the claim of the defendant that it is under this portion of section 10 that it filed its applications for permits to make these diversions, and that the action of the War Department as to the Ware and Swift Rivers, as set forth in the amendment to the answer, is sufficient authority, so far as the federal government is concerned, for them to proceed with the diversions.

Its purpose is to require a permit for work which will have to do with the widening or deepening or obstructing the channel of the stream, but not the diversion of water from the river. There is a considerable difference between the channel through

which water flows and the water flowing through the channel; but even if this part of section 10 did have any application, the proceedings set forth in the amendment to the defendant's answer, showing the action by the Chief of Engineers and the Secretary of War, do not come within the terms of this section. To have any effect, the work to be done must be recommended by the Chief of Engineers, and no recommendation by him appears in either the answer as originally filed or as amended; and the work must be authorized by the Secretary of War prior to the beginning of the same, and there is nothing in either of these documents showing that any work has been authorized by the Secretary of War.

In *paragraphs 6* (page 7) *and 9* (page 8) of the *motion to dismiss the defendant's answer,* the complainant claims that there is nothing in the answer or in the amendment to the answer which shows that any work affecting the capacity of any channel has ever been recommended by the Chief of Engineers or authorized by the Secretary of War, and that therefore no federal authority for these diversions can be predicated upon a compliance with section 10 of the Rivers and Harbors Act of 1899.

In *paragraph 8* (pages 20 to 24) of the *complainant's motion to strike out certain parts of the defendant's answer,* the complainant claims that in none of the quoted portions of the defendant's answer does it appear that the work proposed to be done has been recommended by the Chief of Engineers or authorized by the Secretary of War, as required by this section; and that therefore all reference to this section in the answer should be stricken out as immaterial and irrelevant.

(g) *Federal permits:*

In reference to *paragraph 2* (page 5) of the *motion to dismiss defendant's answer,* inasmuch as the defendant, in para-

graph 2 of its answer (page 4) acknowledged the superior power in the government of the United States to permit the diversion contemplated by the Commonwealth of Massachusetts, and set forth in paragraph 5 of their answer (pages 5 and 6) and that they had filed applications with the Secretary of War to make these diversions, but acknowledged in paragraph 5 (page 6) that no permits had been received from the War Department, that any claim of the power of the United States to permit the diversion was negatived by the fact that no permits had been obtained; and therefore that no possible defense was contained in their answer, upon the ground that no superior federal authority had authorized these proceedings.

In *paragraph 8* of the *motion to strike out certain parts of the defendant's answer* (pages 20-24) the complainant seeks to strike out these references to applications having been filed and to the powers and rights of the United States, inasmuch as no claim was made that actual authority had been received by the Commonwealth of Massachusetts from the federal government to make these diversions, and consequently it forms no part of an adequate defense.

Since the preparation of these two motions the answer has been amended by setting up certain actions of the War Departments as to both the Ware and Swift River diversions, but in neither one of these cases does it appear that any work or any construction or any diversion of water has been either recommended by the Chief of Engineers or approved by the Secretary of War. There is no provision of law which authorizes these two officers to do anything more than recommend and approve. Any other action upon their part is purely voluntary, outside the scope of their duty in the premises, and furnishes no authorization to the Commonwealth of Massachusetts to proceed with its diversion of these waters. So that the action requested in the two motions, denying the proposed defense as

a matter of law, and the striking out of those portions of the answer, either in the original or amended form, as to the activities of either the Commonwealth of Massachusetts or the War Department, should be granted as having no application to an adequate defense in this action.

7. *Reserved powers of states*

Of the several powers and duties in respect to waters which were possessed by the states prior to the adoption of the Constitution of the United States, only one was directly delegated to the federal government. That was the power to regulate and control interstate and foreign commerce. It is only when some interest connected with interstate or foreign commerce is involved that the United States or any of its departments has the authority to provide what shall be done concerning the waters of navigable streams.

The states reserved to themselves a title as trustee to the bed and shores of navigable streams to high water mark; the right to the use of the waters of all navigable streams for navigable purposes not inconsistent with their use for interstate and foreign commerce; as trustee to maintain, preserve and protect the rights of the public to navigate in all of these waters; and the guarantee of the vested rights of the riparian owners along the banks of these streams.

The rights of the several states and of the people under constitutions are guaranteed by the Fifth and Fourteenth Amendments to the Constitution of the United States. These provisions limit the exercise of all grants of power delegated to the United States, including the power to regulate and control interstate and foreign commerce.

U. S. *v.* Adair, 152 Fed., 737.
Adair *v.* U. S., 208 U. S., 161.
Wilson *v.* New, 243 U. S., 332.

So that the United States cannot in any way violate the rights of the people of Connecticut to have the use of all of the water contributing to the navigability of any stream used for such purpose until the navigability of the stream has been developed to its capacity. No more can the United States violate the vested property rights of riparian owners along such navigable stream to use all of the waters flowing in the stream whenever the purposes of navigation have been satisfied so long as such use is not an interference with navigation.

Under our constitution these rights of the people as a whole and of the riparian owners can only be protected through the action of the state in its sovereign capacity when these rights are attacked by another state or commonwealth. As to the people as a whole they can only be represented and their common rights protected by action of the state as trustee for them.

Thus the state is in duty bound to prevent any violation or impending violation of these rights of its citizens who are the beneficiaries of a public trust.

It is contended that if the War Department, through its Secretary of War and Chief of Engineers, has not the power to grant the applications of the Commonwealth and issue permits affirmatively authorizing the diversions sought, it is within their province to inform the applicant that the department will interpose no objection to the proposed diversions if the amount of water specified by them is all that is to be diverted. This was the action taken on the Ware River application.

If the applicant was a riparian owner upon these rivers and intended to use the water for a legitimate riparian use, this position might be sustained. The United States would then say, in effect, to a riparian owner so far as interstate commerce is concerned, your use will not at present interfere with the naviga-

tion on the Connecticut River and we will not object to your exercising your riparian rights to use it. In such a case, however, the riparian owner in using the water does so subject to the right of the United States to stop his user at any time that interstate or foreign commerce requires the return of that water to such use. Besides, his exercise of user is not exclusive and all others on the stream can use the same water for their own needs as riparian owners. There is no complete withdrawal of the waters from the stream. They are returned, after his wants are satisfied, to the stream for the common use of all others below him on the stream.

This is not the situation in the present case. Here the use by the Commonwealth of Massachusetts withdraws the waters entirely from the stream and their subsequent use by other riparian owners. The United States in this instance is not releasing to someone who has a proprietary right to use these waters but to some one who has no proprietary title in their use. They are not released by the United States for a riparian use. They are not released for a purpose connected with navigation.

The United States has nothing to give in the way of title to these waters and release of the waters from the easement of use for purposes of interstate and foreign commerce immediately tends to divest the states through which the stream flows and the riparian owners of their respective rights in the use of those waters.

Such being the case there is no right in the United States to aid, assist, encourage or allow the use of these waters for a non-navigable purpose by someone who has no reversionary right to their use.

> Except as the owner of riparian lands and except for the purpose of regulating interstate commerce, the

> United States has no property in or sovereignity over the streams or watercourses within the boundaries of the several states. The sovereignity and ultimate control is in the state or in the riparian owner, or in both, according to the constitutions and laws of the several states, and the power of the Federal Government over the streams is no greater in the so-called public land states than in the states east of the Mississippi River.
>
> Kansas *v.* Colorado, 206 U. S., 92.

When the War Department issues a permit it is careful to protect both the rights of the states and the rights of individuals. There appears in each permit the following language:

> "NOTE—It is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State or local laws or regulations, nor does it obviate the necessity of obtaining *State assent* to the work authorized. *It merely expresses the assent of the Federal Government so far as concerns the public rights of navigation.* (See *Cummings v. Chicago,* 188 U. S., 410.)"

These permits also contain the provision that they are revocable at the pleasure of the War Department when it is found that the interests of navigation require such revocations.

In the case of the Ware River no restrictions appear. The applicant was informed:

> "Referring to your application of November 30, 1927, for *federal authority* for the diversion of the flood waters of the Ware River for an additional supply for the Boston Metropolitan District, this office has been directed by the Chief of Engineers to inform you *that no objection will be interposed by the War Department* to the diversion of the flood waters of the Ware River exceeding 85,000,000 gallons per day for the period October 16 to June 15 each year." (Italics are ours.)

There is no provision that property rights must be respected, that the states through which the water flows must assent, nor that the objection can be recalled at any time. To say that this is not in effect a permit is rather begging the question. What greater latitude of action could have been extended to this applicant if the authorization had been positive rather than negative. It was merely effecting the same result in a different manner.

8. *Laches—Not applicable to sovereign*

In *paragraph 4* of the *motion to strike out certain parts of the defendant's answer* (pages 12-14) there appear several excerpts from the defendant's answer, wherein they undertake to say that for a century or more there have been exhaustive studies as to the water supply for the Commonwealth of Massachusetts, which studies have been printed in the form of public reports, accessible to the world, and that some of these reports have recommended the use of the Ware and Swift River waters for a water supply for the Metropolitan District of Boston; that the State of Connecticut made no protest during the course of these studies, nor during the period in which plans were being perfected by the Commonwealth of Massachusetts to arrange for these diversions; that the State of Connecticut did not appear before the Great and General Court of the Commonwealth of Massachusetts to make substantial opposition to the legislation; and that the State of Connecticut did not actually commence these proceedings until some overt act upon the part of the Commonwealth of Massachusetts took place in carrying out the plans for this diversion; and that these facts should prevent the State of Connecticut from securing an injunction, on the ground that it had slept upon its rights.

The fact that it took a century of effort and a great number of expert and exhaustive studies to finally determine that the Ware and Swift River waters were advisable to be taken for the

supply of Eastern Massachusetts, might be offered as some excuse why Connecticut should not be expected to believe that they would actually be taken until some overt act apprised them of the fact that the intensive period of study and investigations had ceased. It certainly would have been improper for the State of Connecticut to attempt to interfere with the Great and General Court of Massachusetts in the performance of its duty. As soon as the Commonwealth of Massachusetts actually undertook to carry out the provisions of the two legislative acts authorizing the taking of the waters of the Ware and Swift Rivers, the State of Connecticut proceeded in the only effective way possible, by an application to this Court for an injunction to restrain the diversion of these waters.

The doctrine of laches does not apply to sovereignty.

U. S. *v.* Beebe, 180 U. S., 343, 353.

It will be recalled that in the case of the Sanitary District of Chicago much stress was laid upon the fact that the Lake States delayed their proceedings to enjoin the development of diversion works for such a long period, and that in the interim there had been such a tremendous amount of money expended by the Sanitary District in the development of its works, that these facts should be sufficient for the denial of the relief sought by the Lake States; but this defense did not succeed either before the master or before this court.

Wisconsin v. The State of Illinois and the Sanitary District of Chicago, 278 U. S., 347.

9. *Damage need not be alleged*

In *paragraph 1* (page 5) and *paragraph 7* (pages 17-20) of the *complainant's motion to strike out certain parts of the defendant's answer,* we have set up a number of statements from the defendant's answer to the general effect that the taking of

the waters from the Ware and Swift Rivers will not cause any material damage to either the State of Connecticut or its citizens; and request that these portions of the answer be striken out as not applicable to any valid defense to this action. So far as the present subject under discussion is concerned—that is, rights of sovereignty—it seems unnecessary to more than state the proposition of law to show its existence. If a sovereign right is jeopardized, the question of whether there is any actual damage is immaterial. *Georgia v. Tennessee Copper Co.*, 206 U. S., 230. Even in the case of individuals, if a right is affected by the continued exercise by his neighbor of some inconsistent right, his valuable right may be lost and another acquire one superior to his. This has been held by our courts to be sufficient to warrant the interference by a court of equity to prevent the loss of the right and the acquiring of a new right at his expense. *Water Commissioners v. Perry*, 69 Conn., 461. *Wellington v. Rawson*, 231 Mass., 189. This principle is just as true as between sovereignties. It is especially significant in view of the claim of the Commonwealth of Massachusetts as to laches. If a person must wait until he is actually or substantially damaged before seeking to prevent another from exercising rights inconsistent with his own, by the time he gets ready to insist upon his rights they may be lost through his inaction.

IV. RIPARIAN RIGHTS

		Page
1.	Use of water as an incident to ownership of land ..	43
2.	Such use as a vested property right	43
3.	Includes flood waters	44
4.	Extent of rights	44
	(a) Unimpaired as to quantity and uncontaminated as to quality	44

(b) Reasonable use 45
(c) Use for municipal water supply a non-riparian use 45

5. Taking waters for non-riparian use must be by eminent domain 45

6. Damage need not be alleged or proved 47

Both the State of Connecticut and the Commonwealth of Massachusetts, since their inception, have in general always followed the common law doctrine concerning flowing waters.

1. *Use of water as an incident to ownership of land*

We have already discussed the general proposition that there is no ownership in flowing waters as such. The rights which pertain to flowing waters are wholly derived from the ownership of land along the banks of the stream through which the water flows. The ownership of these lands carries with it, as an incident of such ownership, the right to use, in common with all other riparian owners along the stream, these flowing waters for certain purposes. The use to be made of these waters by any one riparian owner must be of such a character as to be consistent with a like use by all other riparian owners.

King *v.* Tiffany, 9 Conn., 162, 168.
Pratt *v.* Lamson, 84 Mass., 275.
Moulton *v.* Newburyport Water Co., 137 Mass., 163.

2. *Such use as a vested property right*

The use of flowing waters, existing solely because it is an incident to ownership of real estate along the banks of the stream, constitutes such a right a vested property right. It is known as an usufruct. The right is a right in real estate.

Hollister *v.* Union Co., 9 Conn., 435, 443.
Johnson *v.* Jordan, 43 Mass., 234, 239.
Cary *v.* Daniels, 46 Mass., 236, 238.

3. *Includes flood waters*

The right to use the waters of a flowing stream is applicable to all the water which nature supplies in the stream. It is not limited to the amount of water which flows in the stream in any one season of the year or any one year or an average of a number of years. Whether it be during periods of low flow or periods of high flow, commonly known as flood water, or an intermediate flow, a riparian owner is entitled to use of all of them. In Connecticut flood waters occupy in its judicial decisions a class by themselves; and the Supreme Court of Connecticut has specifically said that a riparian owner is entitled to these flood waters to the same extent to which he is entitled to the use of any other flows of the stream.

Thompson *v.* New Haven Water Co., 86 Conn., 597.

In Massachusetts, while this distinction is not so marked, the courts have held that the flow of the stream to which riparian owners are entitled includes all of the waters flowing by nature, including the flood waters.

Nemasket Mills *v.* Taunton, 166 Mass., 540, 544.

4. *Extent of rights*

(a) *Unimpaired as to Quantity and uncontaminated as to Quality.*

The general rule of the common law states is that a riparian owner is entitled to the use of flowing waters as they are wont to flow; that these waters must come to him and must be released by him after use unimpaired as to quantity and uncontaminated as to quality.

King *v.* Tiffany, 9 Conn., 162.
Buddington *v.* Bradley, 10 Conn., 212.
Wadsworth *v.* Tillotson, 15 Conn., 365.

Agawam Canal Co. *v.* Edward, 36 Conn., 476.
Waterbury *v.* Platt Bros. Co., 76 Conn., 435.
Colburn *v.* Richards, 13 Mass., 422.
Anthony *v.* Lapham, 22 Mass., 175.
Johnson *v.* Jordan, 43 Mass., 234.
Elliott *v.* Fitchburg R. R. Co., 64 Mass., 191, 196.

(b) *Reasonable use:*

The rights of riparian owners to use the waters of a flowing stream are limited to such use as will permit of a like use by all other riparian owners along the stream. They include, as a right, the use of the water for watering his cattle, and for a domestic supply for his household, and to a limited extent for the irrigation of his land.

(c) *Use of municipal water supply a non-riparian use:*

The use of water for domestic purposes by a municipality, even where the municipality is a riparian owner, and located upon the banks of a flowing stream, has never been recognized in either the State of Connecticut or the Commonwealth of Massachusetts as a reasonable use of such waters. From the earliest times the right of a municipality to use the waters of flowing streams for such purposes has been granted by legislative acts, and provisions made for compensation to be paid by the municipalities to riparian owners along the stream.

Harding *v.* Stamford Water Co., 41 Conn., 91.
Moulton *v.* Newburyport Water Co., 137 Mass., 16[illegible]
Proprietors of Mills on Monatequot River *v.* Brai[illegible]
tree Water Supply Co., 149 Mass., 478, 486.
Stevens *v.* Worcester, 219 Mass., 128.

5. *Taking waters for non-riparian use must be by eminent domain.*

If any riparian owner desires to use flowing waters for purposes other than those usually considered a riparian use, he

must either acquire those rights to make such further use of the waters by securing deeds or grants from all other riparian owners having an equal right with him to their use, or else he must obtain from the state the power to take the rights of such other riparian owners. In order to acquire this right, the use which he intends to make of the waters must be a public use, for this is the only ground upon which the state can grant the right to take private property; and provision must also be made for the payment of just compensation. It is because the legislative department has recognized the public necessity of developing manufacturing and furnishing a water supply which is adequate to centers of population, that it has authorized, sometimes in specific instances and sometimes by general act, the taking of water for purposes of millwrights, manufacturing plants, and municipal water supply. This has all been accomplished through legislative act, authorizing the taking upon the payment of just compensation; and we can find no cases which authorize the use of water for these purposes without such legislative authority.

> Ætna Mills *v.* Brookline, 127 Mass., 69, 71, 72.
> Ætna Mills *v.* Waltham, 126 Mass., 422, 425.
> Lynfield *v.* Peabody, 219 Mass., 322.

In *paragraph 9* (pages 24-26), *paragraph 10* (pages 27-29) and *paragraph 12* (page 30) of the *complainant's motion to strike out certain parts of the defendant's answer,* there appear a number of allegations claiming that there is authority in the Commonwealth of Massachusetts to take the waters of the Ware and Swift Rivers for the purposes of a domestic water supply, because such use is a reasonable use under the laws of the State of Connecticut and of the Commonwealth of Massachusetts.

The complainant claims that the allegations should be stricken from the answer because they do not set forth the true

rule obtaining in these two states as to the use of flowing water, even though it was intended by Massachusetts to use these waters in a municipality located upon the banks of the stream involved. The defendant has atempted to justify its claims as to reasonable use by a discussion of the principles involved, in its brief on these two motions (pages 42-46).

We cannot quarrel with the general statement that each riparian owner is entitled to a reasonable and just use of the water on its course through his land; and the cases cited are ample to sustain the general proposition; but an examination of all the cases cited fails to disclose any one of them in which the use of water for a domestic supply of a municipality has been sustained. Perhaps the nearest approach to this question is the case of *Stratton v. Mt. Hermon Boys' School,* 216 Mass., 83, 85, in which the waters of a stream, without legislative act, were diverted for the purpose of supplying a boys' school with water. Of course this school would consume much less water than any ordinary town or city, and its use was probably necessary for the satisfactory maintenance of the institution; but the court found that such use was not a reasonable one and awarded substantial compensation to the plaintiff.

6. *Damage need not be alleged or proved*

In a case where there is an invasion of right, as distinguished from damages cause by the exercise of a legal right, the courts have uniformly held in Connecticut and Massachusetts that the question of damage was included in the violation of the right; and that therefore it is unnecessary to allege specific damage in order to seek relief against the invasion of right in a court of equity.

Water Commissioners *v.* Perry, 69 Conn., 461.
Wellington *v.* Rawson, 231 Mass., 189.

In *paragraph* 1 (pages 5-6) and *paragraph* 7 (pages 17-20) of the *complainant's motion to strike out certain parts of the defendant's answer,* there appear quotations from defendant's answer wherein it is claimed that the complainant's action should fail because there will be no material damage caused to the complainant when this diversion is actually effected. The complainant has already shown that its rights as a sovereign and the rights of its citizens will be injured if the defendant is permitted to divert the waters of the streams in question from one watershed into another, and thus deprive Connecticut and its citizens from any use whatever of the waters so diverted. This diversion being admitted by the answer, it is the complainant's claim that upon the record as it now stands there appears an injury to the complainant for which it is entitled to relief in this court as a court of equity. The question of the degree of actual damage which will be caused by the diversion has no application. If the injury exists it should be corrected, and the question of damage or the amount of damage is not material to the case. Therefore the complainant requests that the portions of the answer set forth in those paragraphs be stricken from the record.

V. PARENS PATRIAE

		Page
1.	Individual cannot sue the state	49
2.	Due process of law	49
3.	Equal protection of the law	51
4.	Trusteeship for navigation, fishing and hunting	52

One of the grounds which has been recognized as the basis for state action in controversies arising between states has been the relationship of the state to its people as the guardian of the interests of the whole people or of a large proportion of the people. This duty devolving upon a state arises in some

measure from the situation in which the people of a state find themselves when their property interests are jeopardized by the action of a neighboring state.

1. *Individual cannot sue the state*

While origanlly, under the United States Constitution, it was permissible for a citizen of one state to sue another state where he had been wronged or alleged that he had been wronged by the action of such other state, by an amendment to the constitution (Article XI Amendment to Constitution) this right was taken from the individual; so that at the present time, no matter how many individuals in Connecticut may feel that they have been wronged, or their property rights jeopardized by the action of the State of Massachusetts, they are precluded from attacking the action of the Commonwealth of Massachusetts, because of this constitutional provision. Consequently, the only way in which their rights can be protected is by an action in their behalf by their own sovereign. So that one of the reasons why Connecticut brings this action is because a large proportion of her inhabitants, who are riparian owners upon the Connecticut River, are without remedy except as the State of Connecticut may protect their interests.

2. *Due process of law*

Under the Constitution of Connecticut (article I, sec. 9) the state of Connecticut has guaranteed to its citizens that their property rights shall only be taken from them by due process of law. Due process of law, in the case of an individual owning property or some property rights, means that his property cannot be taken from him for a public use except by the exercise of the sovereign power of eminent domain. So far as the state of Connecticut is concerned, the property owner is

secure in the possession of his property or his property rights, against their being taken in whole or in part, by his own sovereign, except the sovereign acts through its legislative power. He has no protection against the taking of his property or his property rights, by another state, except as the State of Connecticut intervenes in his behalf. If the State of Connecticut is to give effect to this constitutional guarantee, that the property of its citizens shall not be taken for public use except by a valid legislative act of a competent sovereign, then it is its duty, as the guardian of the rights of its people, to proceed against any state which may undertake to exercise this power over the property or property rights of its citizens. Otherwise it cannot successfully carry out its constitutional guarantee to its citizens.

As a further guarantee to the people of the several states, the *fourteenth amendment to the Constitution of the United States* provides.

> "No state shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States, nor shall any state deprive any citizen of . . . . property without due process of law."

Under this provision of the constitution, the State of Connecticut is charged with protecting its citizens from any law which will deprive them of their property without due process of law. We do not believe that it was the intention of this constitutional provision to limit the responsibilities and obligations of a state to securing its citizens in the protection of their property as against itself alone. To furnish adequate protection to all of its citizens, it is equally essential that the state protect its citizens against a neighboring state which may seek to take the property of a citizen of the former state without authority therefor and without due process of law.

3. *Equal protection of the law*

The *fourteenth amendment to the Constitution of the United States* also provides that "No state shall deny to any person within its jurisdiction equal protection of the law". As already suggested, as between the individual citizens of Connecticut and the state, he is protected as to his property or his property rights against any taking of the whole or any part of these rights except by the State of Connecticut, for public use, through the exercise of the power of eminent domain. This means, by the exercise of this power, by a sovereign of competent jurisdiction to whom he owes allegiance. If the State of Connecticut is to provide equal protection of the law, it must means that this security of property rights must extend to all of its citizens. If it is possible that a portion of its citizens are protected against action by the State of Connecticut, and another portion of its citizens is to be deprived of this protection because of the fact that another state can take these property rights from its citizens without the exercise of the power of eminent domain, then it is impossible for the state to provide equal protection of the law for its citizens. In the one case the property right may be taken only through the exercise of the power of eminent domain, and in the other it may be taken without the exercise of this power. Suppose, for instance, that a citizen of Connecticut is a riparian owner on a navigable stream wholly within the confines of Connecticut, and another citizen is a riparian owner on a stream which is an interstate stream: both are riparian owners; both are entitled to the same rights of property. In the first instance the riparian owner is secure in his property rights until the State of Connecticut sees fit to taken them for a public use; in the second case, if the State of Connecticut is going to apply the doctrine of equal protection of the law, his rights cannot be taken until the State of Connecticut sees fit to take it for a public use. Otherwise the state is not in a position to apply the equality of the law to the two riparian owners, although both have the same rights.

4. *Trusteeship for navigation, fishing and hunting*

We have already discussed to a considerable extent the right of the public in the navigable streams of the state to use them for commercial purposes, and also to use the waters for fishing and hunting. The theory upon which the state owns the bed and banks of a stream to either high or low water mark is that they own this property and the use of the waters flowing over it, for public purposes. There is no proprietary interest in this land or the waters, in the state. They are simply held by the state as trustee for the public. As trustee the state is without any power of alienation.

This being so, it is the duty of the state, as the guardian of all its people, to protect this trust. Any diminution of the waters which in any way affects their use for any public purpose, either as they now exist or as they are susceptible of development for any public use, is an injury to the general public.

VI. HEALTH AND COMFORT OF THE CITIZENS

Page

1. Pollution of the stream 52

2. Fish life 53

3. Recreation 53

1. *Pollution of the stream*

It is the duty of the state to secure to its citizens the waters of a stream uncontaminated as to quality. While there is some authority to the effect that the waters of a flowing stream may be used for diluting sewage and industrial waste of communities, there is no right on the part of any riparian owner to so use the waters of a stream that they become contaminated to the injury

of other users of the stream, either above or below them. As pollution of a stream approaches a point where the waters become injurious to public health by reason of the odor or danger to the health of the citizens who have occasion to bathe therein, it is the duty of the state to intervene in their behalf.

2. *Fish life*

One of the duties of the state is to preserve and protect its navigable waters for the general right of the public to fish in these streams. Like navigation, this duty upon the part of the state is as a trustee for the general public; and as such trustee it is the duty of the state, whenever in its opinion a proposed diminution in the flow of the stream is threatened, or the stream is becoming contaminated to such an extent as to affect fish life, to proceed against those responsible for such conditions.

3. *Recreation*

To some extent the state has always considered that an opportunity should be afforded its citizens for proper recreation; and this has been one ground upon which the state has secured to the public the use of its flowing waters and large tracts of land. It is considered in all states and by the United States as a proper subject for public use; and the authority of the state and of the United States is used constantly to take for the public purpose of recreation lands and rights in land for the general public. Anything which, in the opinion of the state, is inimical to this public use of an interstate stream, is a sufficient reason for it to proceed for its protection.

VII. EMINENT DOMAIN

Page

1. Taking is a legislative function 54

2. Compensation is a judicial function 54

3. There must be a legal taking and compensation to exercise this power 55
4. The power is limited by state boundaries 55
5. Powers of the United States 56
6. No sovereign power exists to authorize taking 57
7. Sovereign cannot be forced to accept compensation 57
8. Effect of provision for citizens of one state to come into another and seek damages in the courts of latter state 58

1. *Taking—A legislative function*

The exercise of the power of eminent domain is not a granted power under any constitution. It is an inherent power of sovereignty. The state or the United States, for any public purpose, has the inherent power to take the property of its citizens. The determination of what property shall be taken, and the amount of the property to be taken, is a purely legislative function of government. The only restriction upon this power is that the purpose for which the property is taken shall be a public purpose. So long as the purpose is a public purpose, the courts or the judicial power of the government have no jurisdiction to review the action of the legislative department in authorizing the taking or the determination of whether or not the taking is necessary.

Rindge Co. *v.* County of Los Angeles, 262 U. S. 700.

2. *Compensation is a judicial function*

As contrasted with the taking, all of the constitutions provide that private property shall not be taken for public purposes without compensation. This constitutional provision confers upon the judiciary the determination of whether or not the compensation provided by the legislative enactment is a just

compensation. It also clothes the judiciary with the power of preventing the taking of private property for public use without any provisions for compensation.

Seaboard Air Line Railroad *v.* U. S., 261 U. S. 299.

3. *A legal taking and compensation must exist to be constitutional*

Unless there is a taking of property authorized by some legislative department of government competent to act, and a provision made for just compensation for the property taken, it is impossible to acquire property for public use. Both elements must exist to constitute a proper exercise of the power of eminent domain.

4. *Condemnation limited by state boundaries*

Any state undertaking to exercise the power of eminent domain by legislative act is limited in the extent of its authority to its boundaries. No state has the authority to exercise this power over property or property rights located in another state. The only legislative act which is depended upon as authority for the taking of any riparian rights within the state of Connecticut are the two acts passed by the Great and General Court of the Commonwealth of Massachusetts, known as Chapter 375 of the Acts of 1926, relating to the Ware River, and Chapter 326 of the Acts of 1927, relating to the Swift River.

Kansas *v.* Colo., 206 U. S. 46.

In *paragraph 10* (page 8) and *paragraph 15* (page 10) of the *complainant's motion to dismiss the defendant's answer,* it is claimed that insofar as the answer undertakes to set up acts of the Great and General Court of the Commonwealth of Massachusets which authorize the taking of the waters of the Ware and Swift Rivers, and other streams in connection there-

with, they are void and furnish no legal authority for such taking. The rights of the State of Connecticut and its citizens in the use of the waters of the Ware and Swift Rivers, as they flow into and through the Connecticut River, are property rights existing within the State of Connecticut. When the Commonwealth of Massachusetts undertakes to deprive these owners of their rights in these waters, it is not taking property rights which are located within the Commonwealth of Massachusetts, but property rights which are situated beyond its borders. These acts of the Commonwealth of Massachusetts speak only within the borders of that commonwealth; and insofar as they are depended on for authority to take property located within the State of Connecticut, they are void and furnish no adequate defense to this action.

In *paragraph 6* (pages 14-17) of the *complainant's motion to strike out certain parts of the defendant's answer*, there appear excerpts from the answer setting out the legislative acts of the Great and General Court of the Commonwealth of Massachusetts, as justification for the proposed taking of the waters of the Ware and Swift Rivers. The complainant complains that, because these acts are not sufficient in law, to authorize the taking thereunder of property located within the state of Connecticut, that the allegations furnish no defense to this action and should be stricken out.

5. *Powers of the United States*

There is no provision in the Constitution which delegates to the Congress of the United States the power to authorize the taking of property of one state by another state. The United States is limited in its exercise of the power of eminent domain to those purposes which are specifically delegated by the Constitution to it; and there is nothing in the Constitution which permits or authorizes the taking of property from one state by

the United States and giving it to another state. Nor is there any power delegated under the Constitution to the judicial department of the United States to authorize a taking of property in one state by the legislative act of another state.

Kansas *v.* Colo., 206 U. S., 46.

6. *No sovereign power exists to authorize taking*

The Commonwealth of Massachusetts, having no authority through its Great and General Court to authorize the taking of property located in Connecticut, and no authority residing in the legislative department of the United States to authorize one state to take property situated in another state, there exists no legislative power which can authorize the taking of this property unless it be that the State of Connecticut might authorize the taking of the property of its citizens for a public use in the Commonwealth of Massachusetts.

In *paragraph 12* (page 9) and *paragraph 14* (pages 9-10) of the *complainant's motion to dismiss the defendant's answer,* it is claimed that, because no sovereign power exists to authorize the taking by the Commonwealth of Massachusetts of property located within the State of Connecticut, insofar as the answer undertakes to set up any legislative authority for the diversion of the waters in question, it is not a defense which has any legal basis and should be stricken from the record.

8 Harvard Law Rev., 138.
New York City *v.* Pine, 185 U. S., 93.

7. *Sovereign cannot be forced to accept compensation*

The claim is made that by the acts of the Commonwealth of Massachusetts a provision is made for an award of compensation to be made by the courts of the commonwealth, when the citizens of another state desire to have this question considered by the courts of the Commonwealth of Massachusetts. Whatever effect this might have in the case of individual citizens,

it certainly can have no effect as far as the State of Connecticut is concerned. One state has no right, by legislative enactment to force another sovereign state to accept damages for any injury to its sovereign rights. Such a doctrine would deny the fundamental principles of sovereignty.

> "It is not lightly to be required to give up *quasi* sovereign rights for pay; and apart from the difficulty of valuing such rights in money, if that be its choice it may insist that an infraction of them shall be stopped."
>
> Georgia *v.* Tennessee Copper Co., 206 U. S., 230, 237.

8. *Effect of provision for citizens of one state to come into another and seek damages in the Courts of another state.*

The defendant sets forth on pages 24 and 25 of the answer that, under the two acts in question, of the great and general court of the Commonwealth of Massachusetts, there is a provision:

> "The owner of any real estate, whether within or without the Commonwealth which is not taken but is injured by the taking of the waters of Ware River under authority of this act, or by the construction of the works incidental thereto, shall be entitled to damages therefor and may recover the same from the Commonwealth as in the case of a taking in accordance with the provisions of this act." (Page 38 defendant's answer).

The case of *Manville Co. v. The City of Worcester, 138, Mass., page 89,* is quoted on page 25 of the defendant's answer as apparent authority for the proposition that so long as this provision is contained in the act of the Commonwealth of Massachusetts, it is sufficient to justify the taking of water rights located outside of that Commonwealth.

The property right in Connecticut is injured by an act committed in Massachusetts. The damage occurs in Connecticut; the act that occasioned the damage was done in Massachusetts. Massachusetts sets up the claim that the injured citizen, resident of a sister state, is given an opportunity to resort to the Massachusetts courts to cover damages. His remedy is limited to that set forth in the statute. He must bring his action in the state courts. The Commonwealth of Massachusetts can not force a non-resident owner to come into its courts to redress his damage in contravention to its constitutional provisions and the jurisdiction of the federal courts.

8 Harvard Law Review 138.

VIII. NECESSITY

		Page
1.	Necessity for the exercise of eminent domain	59
2.	Determination of necessity is not a judicial function	60
3.	Meaning of the term "necessity"	60

1. *Necessity of a sovereign with jurisdiction to take for its own public use.*

Where a sovereign, within its own territory, desires to take property for public use, its determination, through its legislative department, of the necessity for the taking is conclusive upon all other departments of government. Practically, a determination that the use to which the property is to be put is a public use is all that is necessary. Where such a condition exists, the statement by the legislative department that the taking is necessary is accepted by the other deparments wihout review. This court has held that the determination of the necessity is a purely legislative matter and is not the subject of review by the court.

U. S. *v.* Chandler Dunbar Co., 229 U. S. 53, 64.

2. *The determination of necessity is not a justiceable issue before the Supreme Court of the United States in a suit between states*

Inasmuch as this court has held that the determination of the question of necessity, where a sovereign acts within its unquestioned power, it not reviewable, there is more reason to claim that, in the absence of any authorized legislative act, this court cannot substitute necessity for a legislative act. If the question of necessity for the taking of private property for public use is so far a legislative power that it cannot be reviewed by the judicial department, then it must follow that the judicial department, of its own motion, cannot substitute necessity for such legislative act.

3. *Meaning of term "Necessity"*

Inasmuch as the Commonwealth of Massachusetts is without the power of eminent domain to take property located in the state of Connecticut, the allegations of necessity and emergency for additional water supply must be intended as justifying a modification or change in the general rule relating to the taking of property. It must necessarily mean that where a state desires property or property rights located within another state, which it has no power to take under its sovereign rights of eminent domain, if the emergency or necessity is great enough, this will justify the court in authorizing or assenting to the taking of the property without the exercise of the power of eminent domain.

The first question to arise in discussing such a theory is the character of the necessity or emergency which will justify such a revolutionary principle of law. We do not believe that even the defendants would claim that the mere pronouncement by the great and general court of the Commonwealth of Massachusetts that a necessity or emergency exists is the true rule to follow.

If such a claim, which we do not admit to exist, is to be considered, the complainant contends that the necessity or emergency must be an absolute one. Where to draw the line between these two extremes would present a most difficult problem. It is a question, however, on which any master, charged with a determination of the facts and the law applicable thereto, would undoubtedly welcome some indication as to the degree of necessity or emergency which must be sustained by the party attempting to justify under it, in order to prevail.

It is, of course, true that any large community, growing in population, finds itself requiring more water from time to time to supply its inhabitants. So long as the state can confine itself to its own resources, it can be very liberal in authorizing such a community to take additional water supplies for such purpose. When, however, they find it expedient to take the water supply of other states, the same degree of liberality does not apply.

We do not concede that an emergency or necessity has any sound justification in law for authority to take property belonging to a neighboring state. The theory depends for its force upon the idea that there is some good reason why an unlimited number of people should continue to reside in one portion of the state or section of the country. Historically, this principle has not proven true. The progress of civilization has rather come from the continued development of new territory. There is nothing in the history of law which would indicate that there has ever been any objection to people seeking the benefits of nature's resources where they are located rather than attempting to have natural resources brought by artificial means to one particular locality.

The commonwealth of Massachusetts very forcefully impresses upon its own people the futility of expecting to live in

any one place, even though that place be the choice of its people. The Swift river act which provides for the obliteration of four towns and parts of seven others; showing that there is apparently nothing inherent against compelling people to move from one place to another, which, of course, would obviate any necessity or emergency.

Unless this be so, there would be nothing to prevent one state from consuming its own resources and all those of a neighboring state, in order that it might expand to an unlimited extent. We do not understand that the Commonwealth of Massachusetts goes this far. There seems to be a theory that it can take the resources of a neighboring state so far as the other state is not in immediate need of them, or so long as the neighboring state or its citizens will not be materially damaged by the present loss of these resources.

The difficulty about this proposition is that the future growth of the Commonwealth of Massachusetts would be predicated upon the resources so taken. If, in the future, a growth of population and consequent need appears in the State of Connecticut that state would be confronted with a limitation as to its ultimate growth because of the fact that a portion of its resources had already been taken by the Commonwealth of Massachusetts. Must it limit its growth in this respect, or is it possible, when that point is reached, to compel Massachusetts to return these borrowed resources? If that is done, what will happen to the increased growth which has been based upon these resources in Massachusetts? If they must be returned, then the added growth which has been built up because of these resources must disintegrate, because, if they are necessary to the continued life of the community, when they are taken away some portion of the community must move to a different section in order to live.

Concededly the present additional water supply required by Massachusetts will be sufficient for only a limited period of time. If the community involved grows as it is expected to grow, a few years from now it will be faced with the same necessity and emergency as it is now claimed confronts it; more water will be needed. It is impossible to continue to take water from a neighboring state without at some point causing material damage. If it is claimed that water cannot be taken if material damage is caused thereby, then it is conceded that there is a point at which development must cease. If that be so, then to allow water to be taken at the present time is only the first step in the building up of a fictitious belief that the community can grow to an unlimited extent. *If it can be limited at any one time, it should be limited when it first attempts to take the resources of a neighboring state.*

Should the state desiring to take water predicate its demand upon showing that it has exhausted all of its available supply? There is no claim in the defendant's answer that it has exhausted all the supplies existing in eastern Massachusetts. We presume this court will take cognizance of the geography of eastern Massachusetts where there appear a number of water supplies which do not involve interstate questions.

If it be claimed that some of these streams are at the present time polluted to such an extent that they are not available for water supply, is it too much to ask that the Commonwealth of Massachusetts purify them so that they can be used for that purpose? The Commonwealth of Massachusetts has ample power as a sovereign to accomplish this result. We believe that it is fair that this should be done before seeking to take the water supplies belonging to the State of Connecticut. Is it incumbent upon the Commonwealth of Massachusetts to show that it has developed all existing supplies in eastern Massachusetts

as a pre-requisite to claiming the property of a neighboring state, because of an emergency or necessity?

These are all questions which must become of vital importance if any consideration is to be given the defense of necessity to this action. They portray in a very small measure the intricate questions which are bound to arise should this court consider the claims of law and equity proposed by the defendant.

The problems which we have suggested are not judicial problems. They are the political problems of government. Whether one section of a state is to thrive at the expense of another section of the state is a matter for the legislature of the state to determine. We can find no cases in which the court has undertaken to solve this problem for a state. Nor do we believe that this court should be asked to determine a question of this character as between two states. And yet, if the problem under discussion is ever recognized by this court, it must be faced sooner or later with the determination of whether the communities of one state shall be given preference over the communities of another state. It is something of this sort which we think this court had in mind in the case of *Wisconsin, et al., v. the State of Illinois and the Sanitary District of Chicago, 278 U. S., 367*, when it stated one of the claims of the complainant states to be:

> "and third, that the injuries to the complainant states deprive them and their citizens and property owners of property without due process of law and of the natural advantages of their position, contrary to their sovereign rights as members of the Union."

In this case, after finding that the federal permits were without legal basis, the injunction sought by the complainant states was granted by this Court.

In *paragraph 16* (pages 10 and 11) of *complainant's motion to dismiss the defendant's answer*, the complainant objects, as a matter of law, to the sufficiency of emergency and necessity as a justification. Also, in *paragraph 3* (pages 8 to 12) of *complainant's motion to strike out certain parts of the defendant's answer*, those portions of the answer which undertake to raise the question of necessity and emergency as a defense are objected to as a matter of law and the complainants ask that they be stricken out.

IX. JURISDICTION OF THE SUPREME COURT OF THE UNITED STATES

		Page
1.	Federal law	66
2.	State law	67
3.	International law	67
4.	Interstate common law	68
5.	Diplomatic settlements	72
6.	No power to legislate	72
7.	Judicial power	73
8.	Serious magnitude of question involved	80
9.	Equity	81

In the case of *Kansas v. Colorado* (185 U. S., 125) this court said:

> "Sitting, as it were, as an international, as well as a domestic tribunal, we apply federal law, state law, and international law, as the exigencies of the particular case may demand."

And in the same case (206 U. S., 46) the court further said:

> "In other words, through these successive disputes and decisions, this court is practically building up what may not improperly be called interstate common law."

It has further been intimated in some of the cases that, inasmuch as many questions arising between states are of a character which, as between nations, would be the subject of diplomatic negotiations, that this power also may have been confided in this court inasmuch as the states are prevented from dealing with questions of a diplomatic character.

Article III, Section 1, of the constitution of the United States provides:

> "The judicial power of the United States shall be vested in one Supreme Court and in such inferior courts as the Congress may from time to time ordain and establish."

Article III, Section 2, of the constitution of the United States provides:

> "The judicial power shall extend to all cases in Law and Equity, arising under this Constitution, the Laws of the United States, and Treaties made, or which shall be made, under their authority; to all cases affecting Ambassadors, other Public Ministers and Consuls; to all Cases of Admiralty and Maritime Jurisdiction; to controversies to which the United States shall be a party; to controversies between two or more states; between a State and the Citizens of another State; between citizens of different states; between citizens of the same state claiming lands under grants of different states, and between a State, or the citizens thereof, and foreign states, citizens or subjects."

1. *Federal law*

Under *article III, section 2, of the Constitution of the United States*, whenever controversies between states involve any provision of the Constitution of the United States, the laws of the United States, treaties made or which shall be made under their authority, or cases affecting ambassadors or the public

ministers and consuls, and cases involving admiralty and maritime jurisdiction, they are questions of federal law, and of course in such case it is the federal law which governs.

This law is to be applied, and has been applied, in those cases where the navigability of interstate streams is involved. Navigation being an incident to the interstate commerce provisions of the constitution, it necessarily follows that questions relating to this subject are to be determined by the federal law, whether the case involves a controversy between two or more states or between individuals.

2. *State law*

The general rule of this court is laid down in the case of *Bank of United States v. Daniel*, 12 Pet., 32, which provides:

> "This court, in accordance to a steady course of decisions for many years, feels it to be an incumbent duty carefully to examine and ascertain if there be a settled construction by the state courts of the statutes of the respective states, where they are exclusively enforced; and to abide by and follow such construction when found to be settled."

In *Kansas v. Colorado*, 206 U. S., 46, in determining the question in issue, the court said:

> "And here we must notice the local law of Kansas as declared by its Supreme Court, premising that the views expressed in this opinion are to be confined to a case in which the facts and the local law of the two states are as here disclosed."

3. *International law*

In the case of *Virginia v. West Virginia*, 220 U. S., 1, it is suggested that in dealing with cases arising between states, it is dealing with a quasi international controversy. In this sense it

may be that the principles applicable to international law may be applied to controversies between two or more states. In the recent case of *Wisconsin v. The State of Illinois and the Sanitary District of Chicago*, 278 U. S., 367, it was claimed upon behalf of the defendant that, although all of the states involved in the controversy were common law riparian ownership states, under international law, common law doctrines should not avail against the diversion of the waters from the Great Lakes by the defendants. This claim, however, must have been overruled by this court, because the prayer for relief by injunction restraining the diversion of these waters was sustained and the injunction granted, and the case referred to the master for a determination as to the period of time necessary to complete the return of the waters to the Great Lakes.

The relative position of the so-called Lake States and the State of Illinois was no different from the relative position of the State of Connecticut and the Commonwealth of Massachusetts in this action. The Lake States claimed that the State of Illinois and the Sanitary District of Chicago had no right to divert any of the waters of the Great Lakes. This court sustained the position and granted the injunction except so far as a small diversion for the purposes of the navigation of the port of Chicago was authorized.

4. *Interstate common law*

As we have already suggested, in the case of *Kansas v. Colorado*, reported in the 206 U. S., pages 46, 95, this court intimated that there had grown up through a series of decisions by this court, interstate common law, to be applied by this court in cases between states as they might arise.

The definition of common law, as stated by Blackstone in his Commentary, is that it is a rule of conduct which has existed since the memory of man runneth not to the contrary. This, of

course, cannot mean that a new principle of law may be injected as common law by either state, or as applicable to controversies between the states, but must necessarily be the result of a long continued practice acquiesced in by substantially all those interested in the subject of the controversy.

If there is one common law rule which has been consistently followed by this court for a length of time sufficient to be denominated interstate common law, it is the rule that where this court determines the laws of the states involved in the controversy to be substantially the same, this is the law which is followed by this court in the particular case before it.

In the case of *Kansas v. Colorado*, 206 U. S., 46, although the court covered a great deal of ground in a general discussion of the powers of this court in cases of this character, the real decision of the case is based upon the statement that—

> "As Kansas thus recognized the right to appropriate the waters of a stream for purposes of irrigation subject to the provisions of an equitable division between the riparian proprietors, she cannot complain if the same rule is administered between herself and a sister state."

In other words, the court, having found that Kansas recognized the rule of appropriation of waters, and Colorado enforced a like rule, that this common rule should be adopted by this court as the rule for determining the issues between the two states.

In the case of *Wyoming v. Colorado*, 259 U. S., 419, the court, having found that the same rule of law was in force in each of the two states then before the court, it applied the common rule in reaching its decision upon the controversy presented to it by those states.

In *3 Enc. U. S. Reports*, page 970, it is stated:

> "There is no common law of the United States, in the sense of a national customary law, distinct from the common law of England as adopted by the several states, each for itself, applied as its local law, and subject to such alteration as may be provided by its own statutes; but general common law exists throughout the United States, not, it is true, as a body of law distinct from the common law in force in the states, but as containing the general rules and principles by which all transactions are controlled, except so far as those rules and and principles are set aside by express statute. Hence, when a common law right is asserted, the laws of the state in which the controversy originated must be looked to."

In those cases which have come before this court concerning boundary lines between states, the sole question before the court has been the determination of the proper boundary line between the two states involved. There has been no difference between the action of this court in determining the boundary line between two states, and the courts of any one of the states in determining the boundary line between the property of two of its citizens. No attempt has been made to divest either state of property to which it was entitled and to give it to the other. It has simply been a question of determining the true line.

This was illustrated in the case of *Louisiana v. Mississippi*, 202 U. S., 1, where the court said:

> "The islands, marsh or otherwise, claimed by Louisiana in this case, were all within three leagues of her coast. The act admitting Mississippi was passed five years after the Louisiana Act, yet Mississippi claims thereunder the disputed territory as being islands within eighteen miles of her shore. If it were true that this repugnancy between the two states existed, it is enough to say that Congress, after the admission of Louisiana, cannot take away any portion of that state and give it to the state of Mississippi."

The fundamental principle in this case is no different than where one property owner has acquired property by deed and his neighbor thereafter has acquired a portion of the same property from the same grantor. The court, in such a case, would necessarily be bound to apply the rule that the grantor exhausted his powers of alienation when he made the first grant, and that the property of the first grantee could not be taken away and awarded to the second grantee.

In the case of *Wisconsin v. The State of Illinois and the Sanitary District of Chicago,* 278 U. S., 367, all of the Lake States, so-called, and the state of Illinois were common law riparian ownership states. According to the claims of the Lake States, as set forth in substance in the reported opinion of this case, they asserted that as riparian owners, and as representatives of their people that they were entitled to the waters of the Great Lakes as nature provided them; and that the State of Illinois and the Sanitary District of Chicago had no right to divert any of these waters for municipal purposes of the Sanitary District.

They further claimed that no legal authority was conferred by the legislative act of the State of Illinois authorizing the diversion. To protect the Lake States against this diversion an injunction was granted by this court as prayed for. It is apparent from the digest of claims, as they appear in the reported decision, of both the Lake States and the state of Illinois and the Sanitary District of Chicago that these states were at issue as to the rights of the respective states to establish and enforce the common law doctrine of riparian ownership within their own borders. To have granted the injunction prayer for in this case, it was necessary for this court, having found that the federal authority was insufficient as a legal basis for the diversion, to have come to the conclusion that the claims

of the Lake States were correct, and that no authority was vested, either in the State of Illinois or in any other place or in this court, to authorize or permit a diversion of the waters of the Great Lakes as against the objections of the Lake States.

5. *Diplomatic settlements*

In *Missouri v. Illinois* (200 U. S., 496; 180 U. S., 208) it is suggested:

> "Diplomatic powers and the right to make war having been surrendered to the general government, it was to be expected that upon the latter would devolve the duty of providing a remedy, and that remedy, we think, is found in the constitutional provisions which we are considering".

The constitutional provisions which were being considered were those relating to the powers of this court. We do not understand by this language that it is within the province of this court to determine questions arising between the states, which, if they were independent sovereignties, might be adjusted by diplomatic discussion between the two states, but rather that where a situation arises that one state is being deprived of its rights as a sovereign power, and where under ordinary circumstances, as a nation, they must make war to protect each other, there is a substitute for this right to make war, and it is to this court that the power is given to protect the the rights of such states. This, we believe, is as far as this court can go.

6. *No power to legislate*

In the case of *Missouri v. Illinois,* 200 U. S., 496, this court said:

> "Therefore, if one state raises a controversy with another, this court must determine whether there is any

> principle of law, and, if any, what, on which the plaintiff can recover, but the fact that this court must decide does not mean, of course that it takes the place of a legislature."

7. *Judicial power*

Article III, section 2, of the Constitution of the United States, so far as it applies to this case provides:

> "The judicial power shall extend . . . . . to all controversies between two or more states."

The subject of this sentence is the judicial power, not controversies between states. It places such controversies in the same classification as it does a number of other controversies involving the federal constitution; federal laws, treaties, ambassadors, public ministers, consuls, admiralty, and maritime questions, citizens of different states, foreign states, and their citizens or subjects.

The fact that the parties to this action are states, clothes this court with no greater judicial powers, nor with any other governmental power, than if the parties were individuals.

In *Kansas v. Colorado,* 206 U. S., 46, it is said:

> "Speaking generally, it may be observed that the judicial power of a nation extends to all controversies justiciable in their nature, the parties to which or the property involved in which may be reached by judicial process, and when the judicial power of the United States was vested in the supreme and other courts, all the judicial power which the nation was capable of exercising was vested in those tribunals, and unless there be some limitations expressed in the Constitution it must be held to embrace all controversies of a judicial nature arising within the territorial limits of the nation no matter who may be the parties thereto."

The judicial power of the United States was a delegated power from the states. It necessarily follows that the judicial power of the United States is no greater and can be no greater than the judicial power of the states from whence the powers were derived. As stated in *Kansas v. Colorado*, "the creature cannot rule the creator". (*Kawananakoa v. Polyblank, Trustee*, etc., 205 U. S., 349.)

In *paragraph 3* (pages 8-12) of the *complainant's motion to strike out certain parts of the defendant's answer*, there appear lengthy quotations from various parts of the defendant's answer, which undertake to set up the doctrine that notwithstanding the fact that the Commonwealth of Massachusetts is not authorized, by the acts of its great and general court, to take the property of the State of Connecticut and of its citizens located within the State of Connecticut, yet there exists a situation which is of sufficient importance to authorize this court to sanction a diversion of the waters of the Ware and Swift Rivers, under its power to determine controversies between two or more states of the union.

It is apparently claimed that, because a grave necessity and emergency exists within the Commonwealth of Massachusetts for an increased water supply for the eastern section of the Commonwealth, that this in itself is sufficient to warrant this court in interposing its great powers, and permitting the diversion to take place, by refusing to the State of Connecticut the injunction which it seeks. The complainant asks that these claims be stricken from the record because they present to this court a prayer which it is without power to grant. The same question is raised in *paragraph 16* (pages 10 and 11) of the *complainant's motion to dismiss the defendant's answer*, the complainant claiming that this proposed defense of the Commonwealth of Massachusetts is not sufficient in law and that

this court is without power to recognize and give effect to such defense.

Both of these motions are based upon *article XIV of the amendments to the Constitution of the United States,* which provides:

> "No state shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any state deprive any person of . . . . property without due process of law; nor deny to any person within its jurisdiction the equal protection of the law."

The affirmative defense of the Commonwealth of Massachusetts sets forth a new principle which has never before occupied the attention of this court. It is impossible to consider the allegations of necessity and emergency, as set forth in the defendant's answer, as pertaining to the two legislative acts of the Commonwealth of Massachusetts relating to the taking of the waters in question. We have already discussed the inability of the Commonwealth to enact laws which are effective beyond the geographical limits of the Commonwealth of Massachusetts. To be of any force, the claim of necessity must be considered as being alleged as a substitute for the authority which these acts have within the Commonwealth of Massachusetts, and the authority for the application of the same rights on the part of the Commonwealth to property within the State of Connecticut.

To determine the sufficiency of this claim it is necessary to first consider the nature of the power which the defendant seeks to have recognized and enforced by this court. The purpose in view is the taking of private property belonging to the State of Connecticut and its citizens, located within the State of Connecticut. Concededly the use for which the property is desired is a

public use. The property which is sought to be taken is private property. It is a fundamental rule that private property cannot be taken for public use without the exercise of the prerogative right of eminent domain. In effect the proposition is that the defendant asks this court to sanction the taking of private property for a public use purely because of the necessities of a large, municipal subdivision of the Commonwealth. It is claimed that there must be some authority authorizing the Commonwealth to take the waters when it is impossible, owing to the physical location of the property, to exercise the power of eminent domain by the Commonwealth of Massachusetts.

As we have already shown, the power to take private property for public use is a legislative function of government; and this court has already held that it has no legislative powers. It is claimed, however, on the part of the defendant, that the ordinary rules which apply in the case of individuals will not be the sole consideration for this court in determining the relative rights of states; that when states are at issue before this court, it has the power to determine the comparative interests of the two states as to the use of the waters in said stream, and award judgment as in its opinion justice may require, irrespective of the technical rights which obtain between individuals in the two states.

The states, in granting or delegating judicial powers to the United States, only extended such judicial powers as applicable to other delegated powers of the United States. The delegated judicial power was certainly no greater than the state judicial power originally. If a judicial question presented is one which a state court would be without power to determine because it is a legislative or executive matter, then this court has no greater power. For instance, if a state court cannot substitute its judgment for the exercise of the power of eminent domain by legislative act, then this court is likewise limited. Suppose the Metropolitan District needed additional water for domestic

purposes; and felt that the waters of the Ware and Swift rivers was its best supply; but that no legislative act of the Commonwealth had been enacted authorizing the taking of these waters; a property owner, a riparian owner on one of these streams instituted an action in the courts of the Commonwealth asking for an injunction to restrain the taking; the District defended by saying we have a great need of water and this supply is the best one we can get; these facts are sufficient and it is not essential that we have a legislative act. Could the court in such case refuse the injunction?

The Commonwealth of Massachusetts may say to the cities of Springfield, Holyoke and Chicopee, as they have already said to a number of towns, your usefulness to the state as communities has ceased. We will decree that you are to be wiped out. Your inhabitants can continue to live in your ancestral homes and drown or you can move to some other thriving community.

This is a sovereign prerogative of the Commonwealth over its own citizens. So long as compensation is provided for, those communities and their citizens can obtain no relief upon an appeal to this court. The determination of this policy is a part of the political problem of government and its wisdom cannot be reviewed by this or any other court. Courts can only recognize that a qualified department of government has acted, and if it be found that the act was lawful, can interfere only to aid in the execution of the policy decreed.

But when the Commonwealth undertakes to extend this policy to a neighboring state, then it is the duty of this court, upon application, to invoke its authority to prevent such acts. The present and future of the City of Hartford should not be subject to the whims or policy of any sovereignty other than the State of Connecticut. It has a right to know that the resources provided by nature are to remain undisturbed unless Connecticut shall see fit to provide otherwise.

The problems pertaining to the natural resources of a state can only be solved by its legislative department of government. This is true as to state courts. Suppose a state court is confronted by the desire, based perchance upon absolute necessity, of a large and growing municipality for an additional water supply. Can it, in the absence of legislative enactment, authorize a taking of the necessary water? It is true that the issue is one proper for the court to pass upon. But its decree must be based upon its judicial powers and in such a case, the court would be limited to restraining an illegal taking of property. It could not authorize such taking, nor refuse to restrain it.

To put the case differently. Suppose the inhabitants of the seven towns of Massachusetts to be removed from existence asked this court for relief, or suppose an inhabitant of Connecticut owning property in the seven towns sought relief in the federal courts from the edict of the Commonwealth that such property is needed for the future of Boston. Could this court weigh the relative interests of Boston and these seven towns and decide that it was of more importance to the country that they should remain in existence and restrain the operation of the act of the Commonwealth? No. The sovereignty of Massachusetts having spoken, this court is bound to recognize its act and aid in its enforcement regardless of what it may think of the wisdom of the action.

By the same token, if the sovereignty undertaking to speak has not the authority, it is equally the duty of this court to prevent the act contemplated, regardless of its opinion that the desired project would be of benefit to mankind.

Every sovereignty, whether it be a nation or a state, finds itself with the resources which nature has provided it. They may be more or less than desired. They are in fact limited. It is the right of every such sovereign to use them as nature has provided

them or to develop them as time and science may suggest, to their fullest extent. The ultimate use may be in their natural state or it may be as man has undertaken to control and aid nature in such development, or it may be both. Whichever is followed, or if both are undertaken, it is the right of the sovereign to say when, in what manner, and how such natural resources are to be handled. This court has said, in the case of navigation, that one hundred years is not a long period in the life of a nation; that merely because navigation has not been developed during that period does not affect the navigability of the stream; and that the stream must continue to be considered as navigable. *Economy Light & Power Co. v. United States, 256 U. S., 113.* How much more reason is there to preserve and protect the waters of a stream when considering their use in a much broader aspect. Navigation is but one of many uses to which flowing water may be devoted.

The riparian owner of property is protected against any taking of his riparian rights except by due process of law. This means a legislative act under the inherent power to take private property for public use through the exercise of the power of eminent domain. If the constitutional provision guaranteeing him such protection is of any force, his rights are secure until his sovereign has taken his property through the medium of a legislative act. Why should he be protected from his own sovereign but at the mercy of a neighboring state which desires his property? Why shouldn't the same principles of law obtain in both instances.

If the courts of Connecticut and Massachusetts are restricted to the enforcement of a legal and valid legislative act authorizing a taking for public use, then this court is similarly limited to a taking authorized by a competent legislative body. Where is there a legislature with competent legal authority to empower such a taking as between states?

8. *Serious magnitude of question involved*

In *New York v. New Jersey and the Passaic Valley Sewage Commissioners*, 256 U. S., 296, this court has said:

> "Before this court can be moved to exercise its extraordinary power under the Constitution to control the conduct of one state at the suit of another, the threatened invasion of rights must be of serious magnitude and it must be established by clear and convincing evidence. *Missouri v. Illinois*, 200 U. S., 496."

One of the claims which the defendant makes in its brief (page 3) is that the insignificance of the contemplated diversion is such as to bring it within the scope of *de minimis non curat lex*. As a vivid picture of this principle, the defendant has seen fit to insert opposite page 56 of its brief, pictures of the Ware and Swift Rivers, although they state on page 58:

> "We do not offer these photographs as having any evidential value. They are submitted purely as a chalk to emphasize our argument that this case involves primarily questions of fact."

Nevertheless it is difficult to inspect these photographs without raising the question in the mind of the court as to the importance of the diversion of these streams. Whatever may be the impression gained from looking at them, the fact is admitted that these are the waters which are to supply for the next substantial period of years the present population of about two million, which it is alleged in the defendant's answer is expected to increase during the next decade or two in proportion to its past growth. Although the amount of water which is apparent in these two pictures is seemingly small, the Commonwealth of Massachusetts has sufficient confidence in the value of these two small streams to feel that the taking of these waters will warrant an expenditure of $65,000,000. To provide for the storing of these waters and their transmission ulti-

mately to the Metropolitan District of Boston, the admitted plans include an aqueduct or tunnel, 25 miles in length from the Wachusett Reservoir to the Swift Reservoir, 12 feet, 9 inches in diameter, and with a capacity of 500,000,000 gallons of water a day. The Swift Reservoir, which is to hold these waters, will occupy territory 39 square miles in area, and will have a storage capacity of 410,000,000,000 gallons. This proposed reservoir, when completed, will be six times the size of the Wachusett Reservoir and will hold six times the amount of water capable of being stored in the latter. To accomplish these objects, the acts of the great and general court of the Commonwealth of Massachusetts, provide for the elimination of four ancient towns entirely and the partial elimination of seven others.

H. D., 1550 Mass., 1922.

9. *Equity*

This case was brought under the equity jurisdiction of this court. The invasion of a right has been alleged, and this court is asked to enjoin the acts of the defendant constituting such an invasion of right.

The defendant claims that there is adequate remedy at law, because any injury which may be occasioned by the taking of these waters can be compensated by money damages. As to claims of this character, in *Georgia v. Tennessee Copper Co., 206 U. S., 230, 237,* this court said:

> "Some peculiarities necessarily mark a suit of this kind. If the state has a case at all, it is somewhat more certainly entitled to specific relief than a private party might be. It is not likely to be required to give up quasi-sovereign rights for pay; and apart from the difficulty of valuing such rights in money, if that be its choice, it may insist that an infraction of them shall be stopped."

And in Missouri *v.* Illinois, 200 U. S., 496, it is said:

> "Can it be gravely contended that there are no preventive remedies by way of injunction or otherwise, against injuries not inflicted or experienced, but which would appear to be the natural results of acts of the defendant, which he admits or avows it to be his intention to commit?"

In *paragraph 5* (page 14) of *complainant's motion to strike out parts of the defendant's answer,* a portion of the answer, in which it is claimed that large sums of money have been expended in preparation, restoring and diverting waters of the Ware and Swift Rivers, is objected to as a part of any defense to this action. The amount which has been expended in this case is probably but a small percentage of the amount spent by the Sanitary District of Chicago in diverting the waters of the Great Lakes for domestic purposes; but in that case it will be recalled that the amount expended formed no part of a valid defense to the action, and an injunction was granted in spite of the expense involved.

X. INTERSTATE COMPACTS

		Page
1.	Constitutional provisions	83
2.	What governmental rights are subject to compact	83
3.	The making of a compact is a legislative act and not a judicial act	84
4.	Control of the United States over terms of compact	84
5.	Policy as to compacts concerning water rights	85
6.	Sovereign must consent to taking	86

1. *Constitutional provisions*

Article I, Section 10, of the Constitution of the United States, provides:

> "No state shall, without the consent of Congress, ... enter into any agreement or compact with another state . . . . "

It is significant that this provision of the Constitution appears under the heading of the legislative powers of the government of the United States. It is part and parcel of the *first provision of Article I,* which provides:

> "All *legislative powers herein granted* shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives." (Italics are ours.)

So that one of the legislative powers granted by the states in Article I is the right to participate in and have the final approval as to any compacts or agreements entered into by the States.

2. *What governmental rights are subject to compact*

In the case of *Kansas v. Colorado,* 206 U. S., 46, in discussing the rights of the states, this court said:

> "It may determine for itself whether the common law rule in respect to riparian rights or that doctrine which obtains in the arid regions of the west, of the appropriation of the waters for purposes of irrigation, shall control. Congress cannot enforce either rule upon any state."

And again, in the same case, when it was urged that some sort of compensatory water or benefit be furnished by the State of Colorado to the State of Kansas, this court said:

> "That would be equivalent to this court's making a contract between two states, and that it is not authorized to do."

In the case of *Louisiana v. Texas,* 176 U. S., 1, 16, which was cited at some length in the case of *Missouri v. Illinois,* 180 U. S., 208; 200 U. S., 496, this court said:

> "Controversies between them arising out of public relations and intercourse cannot be settled either by law or diplomacy, though, with the consent of Congress, they may be composed by agreement."

3. *The making of a compact is a legislative act and not a judicial act*

The quotations from the decisions of the Supreme Court follow the set up of the national Constitution. They recognize that subjects of compact which have to do with the property rights of the several states are matters which can only be decided, and best be decided, by the legislative acts of the two states involved.

In *New York v. New Jersey and the Passaic Valley Sewage Commissioners,* 256 U. S., 296, this court suggested, in dismissing the complaint of the State of New York (page 313):

> "We cannot withhold the suggestion, inspired by the consideration of this case, that the grave problem of sewage disposal presented by the large and growing population living on the shores of New York bay is one more likely to be wisely solved by co-operative study and by conference and mutual concession on the part of representatives of the states so vitally interested in it, than by proceedings in any court, however constituted."

4. *Control of the United States over terms of compact*

The consent of the United States to agreements or compacts among the several states relating to interstate waters is of neces-

sity limited to such interests as the United States has under the Constitution. Unless it has some interest in the navigability or the navigable capacity of a stream, the United States has no jurisdiction. When, however, a navigable stream is affected or may be affected, or the navigable capacity of a stream is affected or may be affected, then the interests of the United States attach, and the authority of Congress must be obtained to make the compact or agreement a valid one.

5. *Policy as to compacts concerning water rights*

The control of the waters of interstate streams by the states through which the stream flows has been recognized by Congress in a number of acts which have been passed relating to this subject. These acts have all recognized that the disposition or the allocation of the waters of interstate streams should be determined in the first instance by the legislatures of the states involved; and under our constitutional provisions any agreements or compacts entered into by the states must be ratified and approved by the Congress of the United States. The following are some of the acts which have been passed by Congress, either authorizing interstate compacts concerning this subject matter or approving compacts already made.

Act of August 8, 1917 (40 Stat., 266, sec. 5). Minnesota and North and South Dakota authorized to make agreements for the improvement of navigation and control of floods on boundary waters and tributaries.

Act of April 8, 1918 (40 Stat., 515). Oregon and Washington, protection of fishing in the Columbia River, etc. (Agreement ratified.)

Act of July 11, 1919 (41 Stat., 158). New York and New Jersey construction of tunnel under Hudson River; consent to agreements authorized by New Jersey and New York.

Joint Resolution of March 4, 1921 (41 Stat., 1447). North and South Dakota, Minnesota, Wisconsin, Iowa and Nebraska; jurisdiction over boundary waters; agreements authorized.

Act of August 19, 1921 (42 Stat., 171). Arizona, California, Colorada, Nevada, New Mexico, Utah and Wyoming; apportionment of waters of Colorado River and its tributaries; agreement to be made by January 1, 1923, subject to approval by legislature of each state concerned, and by Congress.

Joint Resolution of September 22, 1922 (42 Stat., 1058). Kansas and Missouri, development of water works plans for Kansas City, Kans., and Kansas City, Missouri; agreement approved.

Act of January 29, 1925 (43 Stat., 796-798). Colorado and New Mexico; distribution of waters of La-Platte River, compact approved.

Act of March 4, 1925 (43 Stat., 1268). Washington, Idaho, Oregon and Montana; apportionment of water supply of Columbia River and its tributaries; agreement to be made by January 1, 1927, subject to approval by legislature of each state and by Congress.

Act of March 8, 1926 (44 Stat., 195). Colorado and Nebraska; apportionment of waters of South Platte River; agreement approved.

Act of April 13, 1926 (44 Stat., 247, C. 129). Extension of time for agreement by Washington, Idaho, Oregon and Montana, under Act of March 4, 1925, to December 1, 1927.

Act of July 3, 1926 (44 Stat., 831, C, 754). Idaho, Wyoming, Washington and Oregon; apportionment of waters of Snake River; agreement authorized, subject to ratification by Congress.

Act of February 26, 1927 (44 Stat., 1247, C. 216). South Dakota and Wyoming; apportionment of waters of Belle Fourche and Cheyenne Rivers; agreement authorized by ratification by Congress.

Joint Resolution, March 3, 1927 (44 Stat., 1403, C. 382) Provisions of Act of March 4, 1925, Washington, Idaho, Oregon and Montana, as to apportionment of water supply of Columbia River and its tributaries extended to December 31, 1930.

Act of March 2, 1929 (45 Stat., 1502, C. 520). An Act granting the consent of Congress to compacts or agreements between the states of Colorado and New Mexico with respect to the division and apportionment of the waters of the Rio Grande, San Juan, Las Animas Rivers and other streams in which such states are jointly interested.

Act of March 2, 1929 (45 Stat., 1502, C. 521). Granting the consent of Congress to compacts and agreements between the states of New Mexico, Oklahoma and Texas with respect to the division and apportionment of the waters of the Rio Grande, Picos and the Canadian or Red Rivers, and all other streams in which such states are jointly interested.

Act of March 2, 1929 (45 Stat., 1503, C. 522). Apportionment of the waters of the Cimarron River and all other streams in which the states of New Mexico and Oklahoma are jointly interested.

Act of March 2, 1929 (45 Stat., 1517, C. 538). An act granting the consent of Congress to compacts or agreements between the states of Colorado, Oklahoma and Kansas with respect to the division and apportionment of the waters of the Arkansas River, and all other streams in which such states are interested.

6. *Sovereign must consent to taking*

Sovereign rights can only be divested by the voluntary act of the soverign. This may be accomplished in a number of dif-

ferent ways under our form of government. So far as powers have been delegated to the United States, such rights as are necessary to carry into effect such powers have been transferred to the United States by the States.. The ratification of the constitution effected the transfer. It was the voluntary act of the sovereign power of each State. Such act was that of the legislative branch of the government. It is the legislative branch which today must approve of all amendments to the constitution which may seek to delegate further powers to the federal government.

The legislature of a state may also by appropriate action, enter into agreement or compact with another state. But this agreement or compact must be approved by the legislatures of the states involved and by the legislative branch of the United States government. In no case is there any intimation that any department other than the legislative can so act.

Paragraph *thirteen* (Page 9) of the *complainants motion to dismiss the defendant's answer* objects to the legal sufficiency of the answer, because no where does it appear therein that the State of Connecticut has ever consented to the taking of any of the waters involved in this action.

In Hudson Water Company *v.* McCarter, 209 U. S., 349, it was said:

> "But is it recognized that the state, as quasi-sovereign and representative of the interests of the public has a standing import to protect the atmosphere and the water and the forests within its territory, irrespective of the assent or dissent of the private owners of the land most immediately concerned."

And further—

> "It finds itself in possession of what all admit to be a great public good; and what it has it may keep and give no one a reason for its will."

In Georgia *v.* Tennessee Copper Co., 206, U. S., 230, this is said:

> "This is a suit by a state for injury to it in its capacity of quasi-sovereign. In that capacity the state has an interest independent of and behind the titles of its citizens, in all the earth and air within its domain."

And in Kansas *v.* Colorado, 206, U. S., 46:

> "One cardinal rule underlying all the relations of the states to each other is that of equality of right. Each state stands on the same level with all the rest. It can impose its own legislation on no one of the others, and is bound to yield its own views to none."

With these pronouncements in mind, and the law of the two states recognizing the common law doctrine of riparian ownership; the courts of either state being powerless to take the property of one person and give it to another; both states recognizing that the use of water for municipal purposes is not an ordinary riparian use but one requiring the authority of the legislature to authorize; it would seem to be inevitable that this court must respect the judicial power recognized by the courts of the states, and leave the two states to an adjustment of the questions involved through the legislative power provided by the United States constitution, by way of interstate agreement or compact.

Respectfully submitted,

BENJAMIN W. ALLING,
Attorney-General of the State of Connecticut.

ERNEST L. AVERILL,
Deputy Attorney-General.

BENEDICT M. HOLDEN,
Of Counsel.

FILE COPY

FILED
JAN 27 1930
CHARLES ELMORE CROPLEY
CLERK

In the
Supreme Court of the United States

OCTOBER TERM, 1929

ORIGINAL NO. 12

STATE OF CONNECTICUT
v.
COMMONWEALTH OF MASSACHUSETTS

IN EQUITY

REPLY TO DEFENDANT'S ANSWER AS AMENDED.

BENJAMIN W. ALLING,
Attorney-General of the State of Connecticut.

ERNEST L. AVERILL,
Deputy Attorney-General.
BENEDICT M. HOLDEN,
Special Counsel

THE CASE, LOCKWOOD & BRAINARD CO.
HARTFORD, CONN.

In the
Supreme Court of the United States

OCTOBER TERM, 1929

ORIGINAL NO. 13

STATE OF CONNECTICUT

v.

COMMONWEALTH OF MASSACHUSETTS

IN EQUITY

REPLY TO DEFENDANT'S ANSWER AS AMENDED.

---

1. The complainant denies all of the affirmative allegations of the defendant's answer as amended.

2. The complainant further says that there now exists in the Eastern part of the Commonwealth of Massachusetts a full and adequate supply of water susceptible of use for a domestic supply for the Metropolitan District and that there is no necessity now existing to divert waters from the watershed of the Connecticut River Valley to the Metropolitan District for such purpose.

THE STATE OF CONNECTICUT,

By BENJAMIN W. ALLING,
Attorney-General.

ERNEST L. AVERILL,
Deputy Attorney-General.
BENEDICT M. HOLDEN,
Special Counsel.

FILE COPY

OCT 6 1930

Supreme Court of the United States

OCTOBER TERM, 1930

No. 12, Original

THE STATE OF CONNECTICUT, COMPLAINANT
v.
THE COMMONWEALTH OF MASSACHUSETTS,
DEFENDANT

IN EQUITY

MOTION FOR LEAVE TO FILE — COMPLAINANT'S EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER.

BENJAMIN W. ALLING,
Attorney General of the State of Connecticut.

ERNEST W. AVERILL,
Deputy Attorney General of the State of Connecticut.

BENEDICT M. HOLDEN,
Special Counsel.

THE CASE, LOCKWOOD & BRAINARD CO.
HARTFORD, CONN.

In the
Supreme Court of the United States

OCTOBER TERM, 1930

Original No. 12

IN EQUITY

THE STATE OF CONNECTICUT, COMPLAINANT

v.

THE COMMONWEALTH OF MASSACHUSETTS

MOTION FOR LEAVE TO FILE — COMPLAINANT'S EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER.

The State of Connecticut, by its attorney-general, appearing in that behalf by and with the authority, consent and direction of the governor of said state, comes now here and presents this its motion for leave to file in this court its exceptions to the report of the Special Master, and further requests that said exceptions be argued orally and a time fixed for

such purpose. A true copy of said exceptions is hereto attached.

STATE OF CONNECTICUT,
By BENJAMIN W. ALLING,
Its Attorney-General.

ERNEST L. AVERILL,
Deputy Attorney-General.
BENEDICT M. HOLDEN,
Special Counsel.

In the
Supreme Court of the United States

Original No. 12.

STATE OF CONNECTICUT

v.

COMMONWEALTH OF MASSACHUSETTS

IN EQUITY

COMPLAINANT'S EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER

Now comes the State of Connecticut, complainant in the above entitled cause, and excepts to the report filed by Charles W. Bunn, Special Master, and for causes of exception shows the following:

For the convenience of the Court, counsel for the complainant have arranged the exceptions under such headings

as they feel embrace the questions of fact and law involved, to wit:

The Massachusetts Project,
Effect on Navigation,
Effect on Power Capacity,
Effect on Agriculture,
Effect on Pollution,
Effect on Fish Life,
Available Supplies in Eastern Massachusetts,
The Question of Necessity.

THE MASSACHUSETTS PROJECT

EXCEPTIONS AS TO FACTS

Exception First: The complainant excepts to the report of the Special Master as contained on page three of the finding, as follows:

> "The plan of these laws was diversion into Wachusett reservoir (the principal present supply of Boston), of (a) flood waters of the Ware River (act of '26), and (b) certain waters of the Swift river (act of '27) . . . . "

because such finding and designation is contrary to all the evidence in the case and there is no evidence to support the claim that the water to be taken is "flood waters"; and the Special Master should have found and the Court is asked to find that on the Swift river practically one hundred percent of the flow is to be diverted at all times under the Massachusetts legislation, and approximately sixty-nine percent of the flow under the restrictions of the War Department.

Exhibit C-25B.

On the Ware river "flood waters" is defined as "all the waters in excess of a flow of eighty five million gallons per day." This is not flood water but is approximately an average flow which is not exceeded except on 138 days a year.

Exhibit C-13A.

The diversion is not flood waters or excess waters but even during the times of highest flow is from seventy five per cent to ninety per cent of the total flow.

Exhibit C-7A.
Jacobs, R. 275.

Exception Second: The complainant excepts to the failure of the master to find in accordance with the request of the complainant,

> "that the amount of water to be taken from the Ware and Swift Rivers is ascertainable and measurable and is stated by the Chief Engineer of the Metropolitan District Water Supply Commission to be 2% of the average normal flow of the Connecticut River."

Exception Third: The complainant excepts to that portion of finding of the Special Master appearing on page nineteen as follows:

> "The maximum diversions are at high water and amount to from 5 to 6 inches, that is at periods of very high water the stage of the Connecticut may be reduced 5 to 6 inches, at medium stages less, and at very low stages its flow is increased".

and to the failure of the Special Master to find as follows,

> "The quantity of water diverted will vary during the year, effecting a reduction in river stage of approxi-

mately 3 inches or less during low flows and as much as six and a half inches at high flows."

Exhibit C-25A.
Exhibit C-25B.
Exhibit C-41.

Actual diversions will take place even when the gauge is as low as zero effecting a reduction of as much as 3 inches at that time (Exhibit C-41) and even when the gauge is below the critical point of two feet, diversion will take place approximately one half of the time as will appear later. The diversion of water when the gauge is low will affect the capacity of the river for navigation, fishing, and power development while the taking of quantities of water during high stages of the river will injure the fertilizing effect of the flood waters; and during the month of May, when shad are coming up the river, a diversion of flood waters will materially injure fishing. The diversion of water will have an effect on the pollution in the river.

Winsor, R. 137; 650, 651.
Jacobs, R. 272.
Burgie, R. 928-943.

Exception Fourth: The complainant excepts to the failure of the master to find, as requested by the complainant, that over one-half the time when the gauge at Hartford is 2.0 feet or less the natural flow of the Swift River is in excess of 110 cubic feet per second and Massachusetts would be taking water from the river. It is evident that when the Hartford gauge is at the critically low point of 2.0 feet or less Massachusetts is further depleting the supply of water in the river and the suggestions of the War Department would not prevent the taking which will work a mate-

rial reduction below the 2.1 feet on the gauge, and below the point where the water is critically needed.

Exhibit C-41.
Exhibit D-36.

Exception Fifth: The complainant excepts to the report of the special master because of his failure to find as follows:—The Commonwealth of Massachusetts plans to take a supply of water from the Ware and Swift rivers, the waters of which flow into and help maintain the flow of the Connecticut River, and for that purpose has already expended large sums of money in constructing dams, conduits, aqueducts and tunnels and plans to construct a large storage reservoir. The plan provides for tunnels and storage reservoirs and the capacity of each of the two tunnels from the Ware river is in excess of 900,000,000 gallons per day and the plans include the construction of a storage reservoir to store 300,000,000,000 to 400,000,000,000 gallons and to flood between twenty-five and thirty square miles of territory, sixty percent of which territory has already been acquired and tunnels and reservoirs are to be built to take care of an additional supply to be taken from waters in the Connecticut River watershed, including the Millers, Quaboag, Westfield and Deerfield Rivers.

Smith, J. W., R. 2177, 2179, 2181.
Whitman, R. 351, 358.
Winsor, R. 687, 688, 690.

The usefulness of this construction is limited strictly to the carrying and storage of water taken from the Connecticut Valley, and substantially all the expenditures have been made, plans perfected, and work performed since the commencement of this action.

Winsor, R. 60, 65, 92, 93, 131, 202, 203.
Smith, R. 2179, 2181.
Whitman, R. 344, 345, 348, 358.

And this additional supply is intended for the use of the Metropolitan district and other communities which now or hereafter may require water therefrom, and the city of Worcester.

Reprint of Answer, Appendix A, P. 36.

Exception Sixth: The complainant excepts to that portion of the master's finding set forth on page five of the General Facts which states:—

> "Diversions of the Ware and Swift as permitted by the Secretary of War will furnish about 191,000,000 gallons of water per day. The Massachusetts acts do not authorize diversion of any waters other than the Ware and Swift, and as to these the record shows that (as far as counsel can commit it) Massachusetts proposes to abide by the Secretary of War's requirements and restrictions touching the diversions."

insofar as the master failed to find, in addition to the facts found, the following: That, if Massachusetts proposes to abide by the recommendations of the Secretary of War an injunction should issue from this court forbidding it to go beyond the limitations prescribed and set forth in said recommendations. The estimated quantity which will be taken from the Ware and Swift rivers under the advice of the War Department and in accordance with the present plans of the Commonwealth of Massachusetts to accept and abide by the advice of the War Department in the premises, will be 191,000,000 gallons per day. The tunnels nad reservoirs have a capacity to carry and store a much greater volume of water, and have been planned to carry additional water from this source of supply. When planned, a further taking of Connecticut river water was contemplated; and these plans have never been changed or modified to the slightest extent. The

Massachusetts acts authorize diversion of waters other than those of the Ware and Swift rivers and permit a general taking of the water of the Connecticut River tributaries except the Millers River.

Winsor, R. 686, 687, 688, 690.
Smith, J. W., R. 2177, 2179, 2181.
Goodnough, R. 1638.
Whitman, R. 351-358.
Exhibit C-1 and C-2.

Exception Seventh: The complainant excepts to that portion of the finding of the Special Master set forth on page fifty three, which states:

> "Massachusetts says she intends to divert no more water than the Secretary of War permits and in every way to follow the conditions he imposes. It is true that counsel in this case cannot control the future action of Massachusetts."

because there is not a scintilla of evidence in the record that Massachusetts has ever said she intends to divert no more water than the Secretary of War permits or to follow the conditions imposed, except by an answer of counsel to a question asked by the Special Master; and the Special Master should have found that the advice and recommendations of the War Department were received by the Metropolitan District Water Supply Commission on or about May 17th, 1929, that this Commission has never reported any plans to modify the original plans adopted under the Legislation of the Great and General Court of the Commonwealth of Massachusetts, although it has been in session since such advice and suggestions have been received; and there has been no action taken or votes passed by the Great and General Court of the Commonwealth of Massachusetts. The plans made and the construction contemplated under the authority of the legislative acts have not been changed, and when this construction

was planned a further taking of the Connecticut river was contemplated.

Winsor, R. 686-688, 690.

EXCEPTIONS AS TO THE LAW

Exception Eighth: The complainant excepts to the portion of the findings of the master as set forth on page fifty-three which states:

> "The judgment in this case, if it goes in favor of Massachusetts, should settle her right to take only so much water and in such manner and at such times as the Secretary of War permits. It will in no way bar or diminish the right of Connecticut to proceed against the taking of additional future water."

insofar as the Special Master has failed to recommend in addition that Massachusetts should be prohibited and enjoined from taking water beyond certain quantities, and that litigation having been brought to court and heard extensively should settle the controversy between the States; and that this finding is inconsistent with the recommendation that the bill be dismissed.

Exception Ninth:

The Special Master erred and mistook the law in overruling the complainant's claim that any invasion of the rights or privileges of a sovereign state calls for injunction, and does not require specific proof of the actual amount of money damages which might be suffered by reason of such invasion.

Exception Tenth: The Special Master erred and mistook the law in overruling the complainant's claim that the Supreme Court of the United States in a suit between two

states will apply the law of the states rather than a rule of its own.

Exception Eleventh: The Special Master erred and mistook the law in overruling the complainant's claim that where both states have adopted the common law rule of riparian rights, the Supreme Court of the United States has no function but to apply the rule of the common law in force in both States in the determination of a controversy similar to the case at bar.

Exception Twelfth: The Special Master erred and mistook the law in holding and reporting that in a controversy between States, where it is possible to measure the damages inflicted upon the rights existing in one state, the remedy is one at law.

Exception Thirteenth: The Special Master erred and mistook the law in holding that the Supreme Court of the United States can ignore the riparian doctrine as to water rights as applied by the two States which are the only parties to the action before the Court and impose upon them, or one of them, the doctrine of prior appropriation or any other doctrine or rule of law except such as are adopted by and in force in the two states, if the same rule is adopted in both states.

Exception Fourteenth: The Special Master erred and mistook the law in holding that water can be taken from the watershed of an interstate stream and forever removed therefrom so as to deprive the lower State of the use thereof, without the exercise of the Legislative authority prescribed by the Constitution, which is the Legislatures of the two States, with the approval of the Congress of the United States.

Exception Fifteenth: The Special Master erred and mis-

took the law in holding that the commonwealth of Massachusetts has changed the law of riparian ownership and adopted the appropriation doctrine, when it enacted the Ware and Swift river Legislation.

Exception Sixteenth: The Special Master erred and mistook the law in holding that the Commonwealth of Massachusetts has adopted any system of law which will permit the diversion of any water from its streams except by the consent of all riparian owners or by legislative authority to take for public use.

Exception Seventeenth: The Special Master erred and mistook the law in holding that the Massachusetts legislation provides for the taking of the waters of the Ware and Swift rivers only.

Exception Eighteenth: The Special Master erred and mistook the law in holding that the recommendations of the War Department furnished adequate, permanent, or in fact any protection to the interests of the state of Connecticut against a diversion from the Ware or Swift river and other streams tributary to the Connecticut river, except such limitations as may be placed upon this project in the legislation enacted by the Great and General Court of the Commonwealth of Massachusetts.

Exception Nineteenth: The Special Master erred and mistook the law in holding that the acknowledged development of the Swift river and the construction of the aqueduct and tunnel, together with the territory to be supplied and the intention that all future water supply was to come from the west, are immaterial, and not relevant to the issues involved in this case.

Exception Twentieth: The Special Master erred and mistook the law in holding that the taking from the Ware river is limited to the flood waters.

Exception Twenty-first: The Special Master erred and mistook the law in holding that under the laws in force in both Massachusetts and Connecticut the defendant has any right to remove the waters from an interstate stream without the consent of the complainant state.

Exception Twenty-second: The Special Master erred and mistook the law in refusing to hold that the right to all flowing water, including flood water, is a property right, protected under the Constitutions of the United States, the state of Connecticut and the commonwealth of Massachusetts.

Exception Twenty-third: The Special Master erred and mistook the law in refusing to recommend that, if any taking is to be allowed, it shall be limited by decree of the court to the amount which Massachusetts, through its counsel, has undertaken to say, is to be the limit of their taking under the present plans; and in giving effect in his decision to the recommendations of the War Department, which are subject to change and modification by the War Department, without recommending that these recommendations be embodied in the decree of the court.

EFFECT ON NAVIGATION

EXCEPTIONS AS TO FACTS

Exception Twenty-fourth: The complainant excepts to that portion of finding of the Special Master, appearing on page 18:

> "There is no proof of difficulty in navigation at times when the stage of water is 12 feet or even 11 feet, 11 corresponding to an indication on the Hartford gauge of 3 feet. The discharge required from the Swift river reservoir during low water periods will somewhat benefit navigation. I cannot see how the diversion can injure navigation and therefore find that the proposed diversions will not interfere perceptibly or materially with the navigation of the Connecticut."

because said finding is contrary to the evidence; and the Special Master should have found that whenever the gauge at Hartford registers 2.1 feet or more there will always be a diversion from the Connecticut river, because the war Department's restrictions do not provide for any limitation of the diversion above 2.1 feet; and such diversion will materially affect the navigation of the Connecticut river both between Hartford and Holyoke and between Hartford and Long Island Sound; and the Special Master should have further found that in spite of the restrictions recommended by the War Department there will be diversions on an appreciable and material number of days in each year, and such diversions will materially affect the navigation of the Connecticut river between Hartford and Long Island Sound.

Beckwith, R. 830.
Reid, R. 848.
Bacon, R 911-919.
Hill, R. 923.
Burgi, R. 928.
Noble, R. 944.

There is no rule or obligation on the part of Massachusetts to release water from the storage reservoir.

Exception Twenty-fifth: The complainant excepts to the failure and refusal of the Special Master to find the fol-

lowing facts: that the Commonwealth of Massachusetts, by any of its agencies of government, has not submitted any plans or specifications as to any proposed dams, structures or works to be built or constructed in either the Ware or Swift Rivers to either the Chief of Engineers or the Secretary of War, nor have any plans or specifications been recommended by the Chief Engineers or the Secretary of War.

EXCEPTIONS AS TO THE LAW

Exception Twenty-sixth: The Special Master erred and mistook the law in holding that the Congress of the United States has the power or authority to permit the waters of an interstate stream to be diverted from its watershed into another and different watershed without the consent of both of the States through which the water flows.

Exception Twenty-seventh: The Special Master erred and mistook the law in holding that the Congress of the United States has the power and authority to permit the waters of an interstate stream to be diverted for any purpose other than the improvement of interstate and foreign commerce.

Exception Twenty-eighth: The Special Master erred and mistook the law in holding that if Congress has such powers, that they can be delegated to and be exercised by the Chief of Engineers and the Secretary of War; and that if such delegation can be made, it has been made under the provisions of Sections 9 and 10 of the Rivers and Harbors Act of 1899.

Exception Twenty-ninth: The Special Master erred and mistook the law in holding that the proposed diversion dam on the Ware River and the proposed storage dam on the Swift River are not dams or structures within the meaning and intent of Section 9 of said River and Harbor Act.

Exception Thirtieth: The Special Master erred and mistook the law in holding that the waters of the Ware and Swift Rivers are not navigable waters of the United States within the meaning of Section 9 of said River and Harbor Act.

Exception Thirty-first: The Special Master erred and mistook the law in holding that as to the dams proposed to be built in the Ware and Swift Rivers, no plans and specifications need be submitted to and recommended by the Chief of Engineers and approved by the Secretary of War; nor need the consent of Congress be obtained for such structures as provided for in Section 9 of said River and Harbor Act.

Exception Thirty-second: The Special Master erred and mistook the law in holding that the diversion of water from one watershed into another does not affect the navigable capacity of the stream from which it has been taken.

Exception Thirty-third: The Special Master erred and mistook the law in holding that the affirmative act of Congress required in the first clause of Section 10 of the River and Harbor Act is satisfied when the Chief of Engineers or Secretary of War, by refusing to take or abstaining from taking action to prevent a diversion of water from one watershed to another for a non-navigable purpose, allows such abstraction to be accomplished.

Exception Thirty-fourth: The Special Master erred and mistook the law in holding that no affirmative act of Congress is required other than the remaining two clauses of Section 10 of the River and Harbor Act, wherein specific powers are given the Chief of Engineers and Secretary of War.

Exception Thirty-fifth: The Special Master erred and mistook the law in holding that the action of the Chief of Engineers and the Secretary of War in the present instance is legally sufficient to authorize the diversion, although no plans or specifications for the work proposed to be done were ever submitted to nor recommended by the Chief of Engineers nor have any plans or specifications ever been approved by the Secretary of War as provided in Section 10 of the River and Harbor Act.

Exception Thirty-sixth: The Special Master erred and mistook the law in holding that the finding of the Secretary of War that the diversion will not injure appreciably or materially navigation on the Connecticut River is conclusive, if the action is within his authority, upon the State of Connecticut.

Exception Thirty-seventh: The Special Master erred and mistook the law in holding that if the United States is willing to release the water from the burden of interstate and foreign commerce, this action precludes the State of Connecticut from objecting to the removal of such water from both interstate, foreign, and intrastate commerce.

Exception Thirty-eighth: The Special Master erred and mistook the law in holding that the jurisdiction of the United States extends beyond the use of water for interstate and foreign commerce.

EFFECT ON POWER CAPACITY

EXCEPTIONS AS TO THE FACTS

Exception Thirty-ninth: The complainant excepts to the

following findings of fact by the Special Master, appearing on pages 20 and 21:

> "This work so far as the testimony shows, has not been resolved on by the company, and so far as shown the required capital has not been subscribed or arranged for . . . . I know of no objection (assuming that the immaturity of the power project is not fatal) to the court requiring Massachusetts to pay to the power company or its assigns $80,000 if and when the power is developed to the extent stated,"

because the only power development discussed was one of the Northern Connecticut Power Co., which had already been approved by the Federal Power Commission, and the limitations prescribed by this body had been accepted by the corporation, which is an old and well established Connecticut company. The Special Master had no function to perform in this respect except to find whether or not the power possibilities of the river would be damaged by the threatened diversion; and he has placed the damage in this instance at $80,000, and made naïve suggestions that Massachusetts could condemn this power right and pay for it.

Exception Fortieth: The complainant excepts to that portion of the finding of the Special Master on page 21 which reads as follows:

> "from this should be deducted $80,000 representing a saving in capital investment resulting from the required addition to water in low flow furnishing 1,000 additional horse power at low states; this increase of minimum power would cause a corresponding decrease in steam power plant, which will be required to supplement the water in times of low flow. This $80,000 deduction was testified to by Mr. Weston Fuller whose testimony was not questioned."

> "Therefore it appears that if this water power

> is developed to the extent of 50,000 horsepower, the Massachusetts diversion of Ware and Swift waters will cause an injury to the power of $80,000."

because the figures were questioned, and the testimony for the complainant further showed that the net loss of the company after all deductions because of possible increase in flow in low stages, was $160,000.

> Jacobs, R. 323-326.
> Whitman, R. 359, 374.

Exception Forty-first: The complainant excepts to the refusal of the Special Master to find that this water power is a natural resource of the State of Connecticut, and that it will be damaged and depreciated and its development retarded 1% of energy under the Massachusetts legislation, and ¾ of 1% under the restrictions of the War Department.

> Jacobs, R. 325.
> Whitman, R. 359.

EXCEPTIONS AS TO THE LAW

Exception Forty-second: The Special Master erred and mistook the law in holding that either the State of Connecticut or one of its citizens can be compelled to accept a sum of money for property rights belonging to them or either of them, without their consent.

Exception Forty-third: The Special Master erred and mistook the law in failing to find that the State of Connecticut has the right to have its natural resources remain intact and that they can not be taken from it by another state without its consent.

Exception Forty-fourth: The Special Master erred and mistook the law in holding that such damage was not material to the State of Connecticut.

Exception Forty-fifth: The Special Master erred and mistook the law in failing and refusing to find and report that the Acts of the Commonwealth of Massachusetts in the premises caused an appreciable and material damage to the power resources of the Connecticut River at least to the extent of $80,000.00 and that therefore an injunction should issue in accordance with the paper of complainant.

Exception Forty-sixth: That the Master erred and mistook the law in failing and refusing to recommend and report that injunction should issue in accordance with the Plaintiffs' prayer for relief—when said Master finds that the Power capacity on the river in the one instance under discussion was depreciated to the extent of at least $80,000.

EFFECT ON AGRICULTURE

EXCEPTIONS AS TO THE FACTS

Exception Forty-seventh: The complainant excepts to that portion of the finding of the Special Master as set forth on pages nineteen and twenty which states:

> "It needs no testimony to prove that floods and inundations frequently cause damage. The Mayor of Hartford in this case showed dykes built at considerable expense in Hartford to fend off Connecticut river floods."

insofar as the master has failed to find, in addition to the facts found, the following: that there was no need of dykes

or a dyke in Hartford until the aviation field was developed along the banks of the Connecticut river with a view to making a landing place for land and water planes.

Batterson, R. 1228.

Exception Forty-eighth: The complainant excepts to the portion of the finding of the master as set forth on page twenty, which states:

> "The benefit from inundation of the 9,500 acres of hay land is exceptional. The amount of injury to the hay crop likely to result from the Swift and Ware diversion was not proven,—probably is not capable of proof—and was left to conjecture. How much hay land would fail to be submerged because of the diversion is quite uncertain. The land owners who testified showed that the hay lands were not of uniform elevation; that sometimes small areas are not submerged resulting in a diminished crop."—

because it is directly contrary to the evidence given by the farmer land owners to the effect that the hay has been grown without fertilization for many years because of the flood waters; and that the farmers who own the land in the inundated area would not own the property but for this location and the flood benefits it receives; and that they bought this land with this in view; and that in some instances they specified the number of acres which would not be flooded in the event this taking was permitted.

Carrier, R. 744, et seq.
Isaacson, R. 758, et seq.
Hale, R. 774, et seq.
Howe, R. 786, et seq.
Hardin, R. 796, et seq.
Hollister, R. 805, et seq.
Dunham, R. 810, et seq.
Goodrich, R. 816, et seq.
Adams, R. 823, et seq.

Newberry, R. 873, et seq.
Christensen, R. 867, et seq.
Morgan, R. 891, et seq.
Stipulation of Counsel, R. 888.

Exception Forty-ninth: The complainant excepts to the portion of the finding of the Special Master as set forth on page twenty which states:

> "The lessening of spring floods will have its advantages and disadvantages. It will lessen some damages and increase other. On the whole I think the damage to the hay land is not shown to be of 'serious magnitude'; and that such damage, far from being 'established by clear and convincing evidence', is shown by no evidence making it possible of computation or proving that it is large."—

inasmuch as it is without evidence to support it, and the Special Master should have found, in lieu thereof, that counsel stipulated as to the number of acres that would be subjected to damage because of the loss of flood waters, and that this damage having been proved the question of serious magnitude was not in the case; that the stipulation was entered into by counsel after the witnesses had all been summoned to court and after a number had actually testified; that the stipulation was entered into to save time with the distinct understanding, as stated in the record, that other farmers owning land in the Connecticut Valley were present in court and prepared to testify to the damage which they would sustain. There was not a scintilla of evidence in the record that any damage was done by the spring floods.

> Stipulation, R. 888, and Remarks of Counsel pertaining thereto.

Exception Fiftieth: The complainant excepts to the failure and refusal of the Special Master to find the following facts:

That the damage to the agricultural lands in the Connecticut River Valley is appreciable and material. The damage caused is not confined to those portions of the land which will not be covered by the flood waters, but the damage also extends to the total amount of land flooded during the high flows, because of the fact that every inch of lessening of the water deprives the total acreage of the land flooded of that much of the fertilizing qualities of the flood water.

Morgan, R. 895, -6, 909.

EXCEPTIONS AS TO THE LAW

Exception Fifty-first: The Special Master erred and mistook the law in holding that it was incumbent on the complainant to show the money value of the damage to the land in the Connecticut River Valley caused by a lessening of the annual flood flows of the river, after the complainant had proved that the action of Massachusetts would cause material damage.

Exception Fifty-second: The Special Master erred and mistook the law in failing and refusing to hold that the rights of the riparian owners of the lands along the Connecticut River are property rights protected by the constitution of both the State of Connecticut and of the United States.

Exception Fifty-third: The Special Master erred and mistook the law in failing and refusing to hold that such property rights cannot be taken from either the property owners or the State of Connecticut by the legislative act of the Commonwealth of Massachusetts without the consent of the State of Connecticut.

POLLUTION

EXCEPTION AS TO THE FACTS

Exception Fifty-fourth: The complainant excepts to the finding of the Special Master, set forth on page 28, as follows:

> "I think the plaintiff has failed to prove that the proposed diversion would perceptibly increase Connecticut river pollution, and consequently that there is no satisfactory proof of material pollution damage to the Connecticut to result from installing and operating the proposed Ware and Swift works."

Whereas, the Master should have found that the Connecticut River at the State Line between Massachusetts and Connecticut in the autumn of a fairly average year is on the border line of a nuisance, and any material diversion will probably make portions of the river a nuisance; that during 1929 there were 79 instances of dissolved oxygen being below 50% saturation which was dangerous; and that the Connecticut river at the State line is at the present time unsafe for bathing.

> Winslow, R. 512, 513.
> Rudolfs, R. 427.

Exception Fifty-fifth: The complainant excepts to that portion of the finding of the Special Master appearing on page fifty-four, where, after discussing the Massachusetts pollution of streams, he states,

> "However, her practice has not been different from that of Connecticut."

Whereas the Special Master should have found that the State of Connecticut has established a State Water Commis-

sion which is charged by law with the removal of pollution from the waters of the state; that the principal purpose of such removal is to make such waters available for the future water supplies of the towns and cities of Connecticut; that the State of Connecticut itself has caused the removal of pollution from the Connecticut River, where it owns a tract of land near the city of Middletown and used as a State Hospital for the insane and from other streams within the state where state institutions formerly discharged sewage into them; that nearly all large cities and all cities on the Connecticut River have adopted measures varying from the initial stage which is an engineering survey to show what should be done, up to and including the installation and operation of a system of sewage disposal; that the City of Hartford has adopted a program of expenditure in excess of $3,000,000 to treat sewage prior to discharge into the Connecticut River; that New Britain and Middletown, two other cities discharging into the Connecticut, are engaged in surveys for treatment plants; that the last General Assembly of Connecticut incorporated a Metropolitan District of Hartford consisting of some five towns which must be provided with water; that it is the opinion of the Commission that the Hartford District will be one of the first to have to go to a large stream for its future supply, and that the Connecticut should be held for that purpose.

Wadhams, 980-1004.

And the Master should have found further that the Great and General Court of the Commonwealth of Massachusetts had, by legislative enactment, excepted the Merrimac River and the Connecticut River from the jurisdiction of the State Department of Health, leaving these two streams as practically open sewers without any effort on the part of the Commonwealth of Massachusetts to control them or to better them.

Goodnough, R. 1591, 1592.

EXCEPTIONS AS TO THE LAW

Exception Fifty-sixth: The Special Master erred and mistook the law in failing to find that Massachusetts has no right to pollute the waters of an interstate stream to such an extent that they are delivered to the State of Connecticut at the state line in such condition as to be unsafe for bathing and so near the border line that any appreciable diversion therefrom will make the stream become a nuisance, and that so long as the stream remains in such polluted state water can not be diverted from it by the state responsible for the polluted and dangerous condition.

EFFECT ON FISH LIFE

EXCEPTIONS AS TO THE FACTS

Exception Fifty-seventh: The complainant excepts to that portion of the finding of the Special Master appearing on page twenty-two, reading as follows:

> "On the evidence I find that the lowering of flood water resulting from proposed diversions is not shown to be materially injurious to the shad run."

because the Special Master should have found that there are a number of days when the river is so polluted at the state line that fish like shad either migrate or die.

Rudolfs, R. 441.

and that during the whole summer the water is on the border line, and that any quantity of water taken out of the river will be detrimental.

Rudolfs, R. 470-483.
Fraser, R. 960.
Titcomb, R. 964-970.

AVAILABLE SUPPLIES IN EASTERN MASSACHUSETTS

EXCEPTIONS AS TO THE FACTS

Exception Fifty-eighth: The complainant excepts to that portion of the finding of the Special Master appearing on page 50, which states:

> "For example it appears in the evidence that the city of Lawrence, Massachsetts, is the only town using Merrimack water for drinking. The result is a most extraordinary sale of bottled water in Lawrence. It is delivered generally like milk. 1916 statistics showed that the amount of money paid in Lawrence for bottled water was 55% of the total amount paid for public water for all purposes. To force people to bottled water is not conducive to the public health. Such facts as those about Lawrence also show a reason why public opinion ought to be regarded in selecting water supply."

because there is no evidence to support any of the statements above quoted, except the 1916 statistics which were contained in the report of an engineer recommending a new water supply; and the evidence showed and the Master should have found that in 1916 a survey was made, and upon a report received from the engineers the city of Lawrence appropriated money and built additional filter plants, refusing to adopt the suggestion of the engineer that the Merrimac supply be abandoned, preferring to use a filtered and properly treated supply; and that since the installation of the filter plants the records show that the supply obtained from the Merrimac was as good as or better than the supply now furnished to the people of Boston by the Metropolitan Commission; and that the evidence also shows that no survey

of the amount of spring water consumed in Lawrence has been made since 1917.

McCarthy, R. 1779.
Jacobs, R. 2223.

Exception Fifty-ninth: The Complainant excepts to that portion of the finding of the Special Master, appearing on page 45, which states:

> "The Merrimac river has thus become a legalized public sewer."

and again on the same page:

> "There is no certainty of its improvement and no certainty that it will not become more polluted."

because the language above quoted is directly contrary to the evidence, and the Master should have found,

> "The condition of the Merrimac river has been improving steadily from 1918 to 1929."

Eddy, R. 2058.

Exception Sixtieth: The complainant excepts to the failure of the Special Master to find, in accordance with the undisputed testimony of several of the witnesses, that in regard for the safety of the users of the water furnished by the Metropolitan District Water Supply Commission requires that the present water supply should be treated.

EXCEPTIONS AS TO THE LAW

Exception Sixty-first: The Special Master erred and mistook the law in failing and refusing to find that Massachusetts, having pleaded or set up in its answer the affirma-

tive allegation that there was no other source of supply except the supply from the Connecticut Valley watershed, and that unless this taking was permitted great suffering and hardship would ensue, the burden of proof was upon Massachusetts to prove that there was no other source of supply; and that there was a necessity as distinguished from a choice or option; and that the failure of Massachusetts to sustain this allegation in its answer by adequate proof was fatal; and that it was not incumbent upon Connecticut in defending its rights to go into Massachusetts and find available water supplies and prove the existence of their availability.

Exception Sixty-second: The Special Master erred and mistook the law in failing and refusing to find that the burden of proof in showing the necessity for taking waters from an interstate stream, when the taking would work even a slight damage to the adjoining state, was upon the state taking such unusual action.

Exception Sixty-third: The Special Master erred and mistook the law in failing and refusing to find that the burden of proving the necessity for taking waters which contribute to the navigability of an interstate stream was upon the state desiring to take such waters.

Exception Sixty-fourth: The Special Master erred and mistook the law in finding as set forth on page fifty-one of his report as follows:

> "Having found on the first branch of the case that Connecticut will not be substantially and seriously injured by the Ware-Swift diversion and the people of Massachusetts having made their decision in favor of the Ware and Swift, conceding that it is open to Connecticut to ask this Court to overrule the Massachusetts determination and relegate Boston and the Metropolitan District to the water supplies in the

> eastern part of the state, certainly the burden is on Connecticut to make peculiarly clear and conclusive showing. I content myself with finding that no such showing has been made. Giving the proof of Connecticut the utmost weight it no more than raises a doubt."

and on page twenty-nine of the report:

> "And were it made clearly to appear that Boston and the other population in northeastern Massachusetts have an abundance of perfectly good water at home, that might be a good reason why equity should enjoin their going to the Connecticut watershed and thereby causing a neighboring state even a small damage.
>
> "In this view, I have regarded as important the allegation of Connecticut in an amendment to the bill that the Boston district as well as the neighboring population can well be supplied with good water from the eastern part of the state."

whereas, under the pleadings and the rules, the burden was upon Massachusetts to show that it had no other available supply and that the taking of this water was a necessity.

Exception Sixty-fifth: The complainant excepts to the misstatement by the Special Master of the position of Connecticut, appearing on pages 49 and 50 of the report, as follows:

> "Connecticut in this respect is calling on the Supreme Court of the United States to determine how much water supply is now available and will continue available for a long period of time for the inhabitants of the whole northeastern part of Massachusetts; to determine how much of this water is fit for human use and will remain so far a long period

> of years; to say how much of it ought to be fitted for use, involving cost and expense of fitting reasonable to be imposed on the public; and to divide the supplies among the towns and cities and other communities of the region."

whereas Connecticut has contended that the supply in eastern Massachusetts was adequate, and by reasonable and proper treatment could be made available. Connecticut has never contended that the Supreme Court of the United States should determine how much water was fit for human use or how long it would remain so, or how much of it ought to be fitted for human use or that the question of cost and expense of fitting the water for use was a question before the Supreme Court, or that the Supreme Court had any function whatever to perform in dividing the waters among the towns and other communities in this region; and such a conclusion is unwarranted and unfounded on any claim made in pleadings, evidence or argument in the case.

THE QUESTION OF NECESSITY

EXCEPTIONS AS TO THE FACTS

Exception Sixty-sixth: The complainant excepts to the failure and refusal of the Special Master to find that all of the Massachusetts experts testified that if the Ware and Swift river waters could not be obtained, eastern Massachusetts could be supplied with water.

Kennison, R. 1944, 2129.
Barber, R. 1989.

Exception Sixty-seventh: The complaint excepts to that

portion of the master's findings set forth on page six of the General Facts, which states:

> "In addition Connecticut alleges by an amendment to its bill that the Boston district can well be supplied with good water from the eastern part of Massachusetts and for this reason should be enjoined from subtracting in the least from the flow of water into the Connecticut."

whereas the Special Master should have found that the Commonwealth of Massachusetts pleaded in its answers that it requires a suitable supply of pure and unpolluted drinking water, *which can be obtained from no other source within the Commonwealth except from the watershed of the Connecticut River*, Answer, Page 30.

By reason of the great emergency existing in the Commonwealth of Massachusetts, as above set forth, because of the great and immeasurable suffering which would be caused to the citizens of Massachusetts if said diversion be not permitted, and in consideration of the fact that the State of Connecticut and the inhabitants thereof will suffer no material damage by reason of said diversion.

Answer, Page 32.

And that the Commonwealth of Massachusetts affirmatively alleged a great and pressing necessity which could be met in no way other than to take the waters of an interstate stream, which contributed to the navigability of the Connecticut river, and the Commonwealth of Massachusetts did not introduce any proof whatever in support of its allegations, but it was proved by abundant testimony that there was an abundant and adequate supply in eastern Massachusetts.

Barbour, R. 1989, 1998.
Kennison, R. 1842-1845, 1944.
Jacobs, R. 1027 et seq.
Sanborn, R. 1911.
Fuller, R. 2018.
Eddy, R. 2088.
Exhibit C-1, 159.
Exhibit C-2, 14.
Exhibit C-3, 103.
Exhibit C-32 and C-39.

EXCEPTIONS AS TO THE LAW

Exception Sixty-eighth: The Special Master erred and mistook the law in determining the question of necessity by disregarding entirely the testimony that contaminated or polluted water can be treated scientifically and made pure and wholesome for domestic use, and that many of the larger cities in the world are supplied in this manner.

Exception Sixty-ninth: The Special Master erred and mistook the law in holding that in deciding the question of necessity the question of abandonment of existing and usable water supplies could not be considered.

Exception Seventieth: The Special Master erred and mistook the law in holding that the party pleading necessity has a choice of supplies which can be considered.

Exception Seventy-first: The Special Master erred and mistook the law in holding that in determining the question of necessity for domestic use as set forth in the plea of necessity in the defendants' answer, the use of water for industrial and recreational purposes must be given consideration.

Exception Seventy-second: The Special Master erred and

mistook the law in holding that in determining the question of necessity the first fact and the important one is that the people of Massachusetts decided against the existing eastern water supply by passing the Ware and Swift legislation.

Exception Seventy-third: The Special Master erred and mistook the law in holding that in determining the question of necessity the court should take into consideration the fact that important factories using water for process water, which might be diverted and thereby infringe upon their manufacturing requirements was an important and governing factor in the consideration of the prier.

Exception Seventy-fourth: The Special Master erred and mistook the law in failing to find and give legal effect to the testimony of all the Massachusetts experts to the fact that if Massachusetts could not take the water from the Ware and Swift rivers, a supply in eastern Massachusetts could be obtained.

Exception Seventy-fifth: The Special Master erred and mistook the law in holding that the proceedings beginning with the letters of the Metropolitan District Water Commission to the Secretary of War and the subsequent correspondence between these parties was a compliance with the provisions of the Acts of Congress enacted for the protection and development of navigation and navigable capacity of the waters of the United States.

Respectfully submitted,

THE STATE OF CONNECTICUT

By BENJAMIN W. ALLING,
Its Attorney-General.

ERNEST L. AVERILL,
Deputy Attorney-General.
BENEDICT M. HOLDEN,
Special Counsel.

FILE COPY

FILED
DEC 15 19
CHARLES ELMORE C

In the Supreme Court of the United States

OCTOBER TERM, 1930

Original No. 12

STATE OF CONNECTICUT

v.

COMMONWEALTH OF MASSACHUSETTS

IN EQUITY

BRIEF FOR THE COMPLAINANT IN SUPPORT OF EXCEPTIONS TO REPORT OF SPECIAL MASTER

BENJAMIN W. ALLING,
Attorney-General of the State of Connecticut.

ERNEST L. AVERILL,
Deputy Attorney-General.

BENEDICT M. HOLDEN,
Special Counsel.

THE CASE, LOCKWOOD & BRAINARD CO
HARTFORD, CONN

In the
Supreme Court of the United States

OCTOBER TERM, 1930

Original No. 12

STATE OF CONNECTICUT

v.

COMMONWEALTH OF MASSACHUSETTS

IN EQUITY

BRIEF FOR THE COMPLAINANT IN SUPPORT OF EXCEPTIONS TO REPORT OF SPECIAL MASTER

BENJAMIN W. ALLING,
Attorney-General of the State of Connecticut.

ERNEST L. AVERILL,
Deputy Attorney-General.

BENEDICT M. HOLDEN,
Special Counsel.

INDEX

GENERAL HEADINGS

		Page
I.	EXCEPTIONS	ii
II.	PLEADINGS	3
III.	JURISDICTION	8
IV.	STATEMENT OF THE CASE	8
V.	MASSACHUSETTS PROJECT	19
VI.	NAVIGATION	80
VII.	POWER	121
VIII.	AGRICULTURE	131
IX.	POLLUTION	140
X.	FISH LIFE	162
XI.	MASSACHUSETTS ANSWER	168
XII.	AVAILABLE SUPPLIES	173
XIII.	NECESSITY	220
XIV.	CONCLUSION	239

SUB-HEADINGS

I. EXCEPTIONS.

Massachusetts Project

	Page
First	47
Second	49
Third	56
Fourth	56
Fifth	43
Sixth	22
Seventh	50
Eighth	50
Ninth	76
Tenth	64
Eleventh	64
Twelfth	75
Thirteenth	64
Fourteenth	72
Fifteenth	69
Sixteenth	69
Seventeenth	22
Eighteenth	50
Nineteenth	43
Twentieth	47
Twenty-first	74
Twenty-second	56
Twenty-third	50

Navigation

Twenty-fourth	85
Twenty-fifth	88
Twenty-sixth	106

Navigation—Cont'd Page

Twenty-seventh 106
Twenty-eighth 107
Twenty-ninth 109
Thirtieth 109
Thirty-first 111
Thirty-second 112
Thirty-third 114
Thirty-fourth 114
Thirty-fifth 115
Thirty-sixth 116
Thirty-seventh 116
Thirty-eighth 120

Power

Thirty-ninth 122
Fortieth 124
Forty-first 123
Forty-second 126
Forty-third 127
Forty-fourth 123
Forty-fifth 130
Forty-sixth 130

Agriculture

Forty-seventh 135
Forty-eighth 135
Forty-ninth 135
Fiftieth 135
Fifty-first 131, 137
Fifty-second 138
Fifty-third 140

Pollution

Fifty-fourth 158
Fifty-fifth 159
Fifty-sixth 144

Fish Life

Page

Fifty-seventh 165

Available supplies in Eastern Massachusetts

Fifty-eighth 190
Fifty-ninth 196
Sixtieth 217
Sixty-first 172
Sixty-second 172
Sixty-third 172
Sixty-fourth 172
Sixty-fifth 172

Necessity

Sixty-sixth 221
Sixty-seventh 223
Sixty-eighth ..... (omitted)
Sixty-ninth 225
Seventieth 228
Seventy-first 226
Seventy-second 229
Seventy-third 226
Seventy-fourth 221
Seventy-fifth ..... (omitted)

II. PLEADINGS 3
Complaint 4
Answer 5

III. JURISDICTION 8

IV. STATEMENT OF THE CASE 8
Massachusetts Project 10
Navigation 12
Power 13
Agriculture 13

IV. STATEMENT OF THE CASE—*Cont'd*

Page

Pollution 14
Fish Life 15
Available Supplies 15
Necessity 16
The Real Issue 18

V. MASSACHUSETTS PROJECT

Massachusetts is naturally divided into two watersheds 19
The Western Section of Massachusetts lies in the Connecticut Valley 19
The Eastern rivers drain into the Atlantic Ocean in Massachusetts 19
The Metropolitan Water District lies in the Eastern watershed 20
Legislative acts authorizing diversions include other waters besides Ware and Swift Rivers. (Exceptions 6 and 17) 21
Legislative acts concerning construction of works intend further diversions 23
Legislative reports concerning size and character of works 24
Work so far accomplished 29
Metropolitan District demand for water 33
Demand for Northeastern Massachusetts 35
Intention to abandon present sources of supply 38
Sources available in Eastern Massachusetts will not be used 38
Even with Ware and Swift development, the available supply will be insufficient before 1970 39
Future supplies to come from the Connecticut watershed 40
Legislation as to other diversions, size of works and expressed intention to use the Connecticut watershed for the future is material. (Exceptions 5 and 19) 42

V. MASSACHUSETTS PROJECT—*Cont'd* Page

Present proposed taking on Ware and Swift Rivers ... 45
Flood flows not only water taken. (Exceptions 1 and 20) 45
War Department suggestions as to Ware and Swift Rivers 47
Taking from two streams is determinable. (Exception 2) 49
Suggestions of the War Department have never been reported to nor accepted by the legislature of Massachusetts 49
Decree in this case should limit the diversion at least to the restrictions suggested by the Secretary of War. (Exceptions 7, 8, 18 and 23) 50
Diversions will reduce flow of Connecticut River at all stages either with or without War Department suggestions. (Exceptions 3 and 4) 53
The use of flowing water is a real property right. (Exception 22) 56
Such use is a vested property right 57
Includes flood waters 57
Extent of rights 58
Unimpaired as to quantity and uncontaminated as to quality 58
Reasonable use 58
Use for municipal water supply a non-riparian use 59
Taking waters for non-riparian use must be by eminent domain 59
Sovereign must consent to taking 60
The common law rule as to riparian ownership is effective in both Connecticut and Massachusetts 62
The law of the two states governs an action between them and no new rule of law can be imposed upon them or either of them. (Exceptions 10, 11 and 13) 63

V. MASSACHUSETTS PROJECT—*Cont'd* Page

Massachusetts has not changed this rule. (Exceptions 15 and 16) 69
No competent legislative authority has authorized the taking of these waters. (Exception 14) 72
Waters cannot be taken without the consent of Connecticut. (Exception 21) 74
There is no adequate remedy at law. (Exception 12) .. 75
Sovereign cannot be forced to accept compensation 75
Effect of provision for citizens of one state to come into another and seek damages in the courts of another state 75
Money damages is not governing factor. (Exception 9) 76
The injury by a taking of real property rights without consent of Connecticut justifies an injunction 79

VI. NAVIGATION

Navigation actually exists between Hartford, Conn. and Holyoke, Mass. 80
Congress has adopted a definite project and appropriated money therefor 80
Navigation will be affected by any diversions when the Hartford gauge is 4.5 feet or less 81
Diversions will always occur at such gauge heights 82
Navigation between Hartford and Long Island Sound is extensive 82
Congress has adopted a definite project which has existed for many years 83
The project depth has never been maintained 83
Between 3 and 4 feet in the Hartford gauge required to maintain fair navigation 83
Diversions will always occur at these gauge heights. (Exception 24) 84
Present navigation on the Connecticut River is difficult and expensive in low flows 86

VI. NAVIGATION—*Cont'd*

Page

Two feet on the Hartford gauge is the point from which the project depth is reckoned 87
Diversions will occur at 2 feet on Hartford gauge even under War Department suggestions 87
No plans or specifications have ever been submitted for the dams and structures to be erected. (Exception 25) 87
Distinction between ownership of land and use of water 89
State's right to adopt policy covering its waters 90
State's right as to non-navigable streams 92
Original power of states as to navigable streams 92
Ownership of bed and banks of stream 94
Trusteeship for the public 95
Individual rights 96
Intrastate, interstate and foreign commerce 98
Delegated powers of the United States 99
As to interstate and foreign commerce 99
Includes navigable stream and its tributaries 100
Navigable capacity 102
Trusteeship 105
Section 9, Rivers and Harbors Act, 1899 108
Section 10, Rivers and Harbors Act, 1899 112
Reserved powers of states 116

VII. POWER

	Page
There is an existing water power site	121
It is susceptible of development	121
These plans have been approved by the Federal Power Commission	121
The Commission has found that the company is able to carry out the development. (Exception 39)	122
The power will be substantially reduced by proposed diversion. (Exception 41)	123
Such damage is material. (Exceptions 40-44)	123
Neither state nor its citizens can be compelled to accept money damages for loss of natural resources. (Exception 42)	126
Natural resources cannot be taken from a state without its consent. (Exception 43)	127
An injunction should have been granted. (Exceptions 45 and 46)	130

VIII. AGRICULTURE

Inundations of meadow land an annual occurrence (Exception 51)	131
Necessary to lands along the river	132
Higher flows will be decreased materially	133
Loss of water means loss of fertilizing material	134
Damage to city can and is being eliminated. (Exception 47)	134
Injury to inundated lands is material. (Exceptions 48, 49 and 50)	135
Amount of damage in dollars immaterial. (Exception 51)	136
Right of land owner is a property right. (Exception 52)	138
Must be legislative act to take this property right. (Exception 53)	139

IX. POLLUTION

	Page
Scope of Investigations	140
Present condition of river at Connecticut-Massachusetts state line. (Exception 56)	142
Slight decrease of oxygen will tend to create nuisances	145
Sludge beds	146
Bathing	147
Water Supply	148
Connecticut River as compared to other streams	149
Population capacity	150
Sources of pollution	154
Improvement between Connecticut-Massachusetts state line and Hartford	154
Effect of the diversions	155
(a) War Department's restrictions do not necessarily affect pollution	155
(b) During high flow	156
(c) During low flow	156
There will be actual diversion during low flow. (Exception 54)	157
Future effects of the diversion	158
Water policy of Connecticut as to pollution. (Exception 55)	159

X. FISH LIFE

Page

Connecticut is engaged in a program for the propagation of fish 162
Connecticut River now on border line for fish life to survive 163
Fish life affected by reductions of low flow 163
Diversions will be made during low flows 164
Fish life also dependent upon spring freshets. (Exception 57) 164
Diversions will be substantial during freshet time 167
Shad merely an indication as to fish life in general .. 167
Shad catch affected by diversions and other fish life necessarily affected 167

XI. MASSACHUSETTS ANSWER

Massachusetts Answer 168
(Exceptions 61, 62, 63, 64 and 65) 172

XII. AVAILABLE WATER SUPPLIES IN EASTERN MASSACHUSETTS

Page

Massachusetts legislative reports 174
The 1895 report 174
The 1922 report 176
The 1925 report 185
Complainant's investigations 186
Two particular plans of development for Eastern Massachusetts water supply resources were suggested 187
The Merrimac River development 187
The yield of the Merrimac River is unlimited 188
Lawrence, Mass. obtains its water supply from the Merrimac River 189
The Knowles' report of 1917. (Exception 58) 189
Department of Public Health report 193
The Lawrence filters 193
The quality of Lawrence water compares favorably with that of the Metropolitan District 194
Points advanced by Massachusetts as reasons for not choosing the Merrimac River 194
Pollution of the river. (Exception 59) 195
Damages to power interests in Lowell and Lawrence 198
Possible damages to navigation 200
Possibility of a breakdown due to the human element in the purification process 202
Public opinion 207

XII. AVAILABLE WATER SUPPLIES IN EASTERN MASSACHUSETTS—*Cont'd* Page

Modern trend toward the adoption of filtration in the protection and preparation of a public water supply. (Exception 60) 209

Methods of scoring water supply 213

There are available in Eastern Massachusetts other supplies than the Merrimac River .. 215

These supplies have never been developed .. 216

Massachusetts admits the availability of certain portions of the water in the 15-watershed plan 217

Abandonment of these supplies is unnecessary 218

The 15-watershed plan plus present supplies adequate for Metropolitan District 219

XIII. NECESSITY

Sufficient supplies exist for the Metropolitan District and Northeastern Massachusetts 220

If the Ware and Swift water cannot be obtained, Eastern supplies can be made available (Exceptions 66 and 74) 221

The burden was on Massachusetts to show that no supplies existed in Eastern Massachusetts. (Exception 67) 223

Purifying of water feasible, practicable, and generally accepted in the larger cities of the world. (Exception 68) 224

In determining necessity the abandonment of usable supplies should not be considered. (Exception 69) 224

In determining necessity the use of water for industrial and recreational purposes should not be considered. (Exceptions 71 and 73) 226

XIII. NECESSITY—*Cont'd*

Page

Necessity does not mean that a choice can be made of available supplies. (Exception 70) 228
The decision of Massachusetts not to use water which can be made safe for consumption should not be a governing factor in determining necessity. (Exception 72) 229
The necessity claimed must be an alternative for the exercise of eminent domain and should be construed strictly against the state claiming it 230
Eminent domain is a legislative function of government 230
Determination of necessity is not a judicial function ... 231
Remedy by interstate compact should be exhausted before resort to a court of equity 231
Constitutional provisions 232
What governmental rights are subject to compact 233
The making of a compact is a legislative act and not a judicial act 233
Control of the United States over terms of compact 234
Policy as to compacts concerning water rights 234
Sovereign must consent to taking 237

XIV. CONCLUSION

Conclusion 239

INDEX OF AUTHORITIES

United States Supreme Court Cases

Page

Adair *v.* United States, 208 U. S., 161 116

Boquillas Land & Cattle Co. *v.* Curtis, 213 U. S., 339.. 96
Broder *v.* Water Co., 101 U. S., 274 96

Cohens *v.* Virginia, 6 Wheat, 263 8
Cummings *v.* Chicago, 188 U. S., 410 119

Donnell *v.* United States, 228 U. S., 243 94

Georgia *v.* Tennessee Copper Co., 206 U. S., 230
8, 62, 75, 127, 128, 138, 238
Gibson *v.* United States, 166 U. S., 269 100
Grand Rapids Co. *v.* Butler, 159 U. S., 87 95

Hardin *v.* Jordan, 140 U. S., 371 96
Hudson Water Company *v.* McCarter, 209 U. S., 349 61, 127
238

Illinois Central Railroad Co. *v.* Illinois, 146 U. S., 387.. 100

Johnson *v.* M'Intosh, 8 Wheat, 543 94

Kansas *v.* Colorado, 185 U. S., 125, 206 U. S., 46
8, 61, 63, 64, 65, 96, 119
Kaukauna Co. *v.* Green Bay Co., 142 U. S., 254 96

Louisiana *v.* Texas, 202 U. S., 1 233
Louisiana *v.* Mississippi, 202 U. S., 1 67

Martin *v.* Waddell, 16 Pet., 367 94
Miller *v.* New York, 109 U. S., 385 101
McCready *v.* Virginia, 94 U. S., 391 100
Missouri *v.* Illinois, 180 U. S., 208, 200 U. S., 496, 8, 77, 78
Mobile Transportation Co. *v.* City of Mobile, 187 U. S.,
479 94
New York *v.* Illinois, 274 U. S., 128 128

INDEX OF AUTHORITIES—*Cont'd*

Page

New York *v.* New Jersey, 256 U. S., 296.... 8, 77, 78, 234
New Jersey *v.* Sargent, 269 U. S., 328 128
New York City *v.* Pine, 185 U. S., 93 126
North Dakota *v.* Minnesota, 263 U. S., 265 77

Packer *v.* Bird, 137 U. S., 661 95
Pennsylvania *v.* West Virginia, 263 U. S., 553 8
Pollard *v.* Hagen, 3 How., 212 94

Rindge Co. *v.* Los Angeles, 262 U. S., 700 73

Scott *v.* Lattig, 227 U. S., 229 94
Shivley *v.* Bowlby, 152 U. S., 1 ..... 94, 95
St. Anthony Falls Water Power Co. *v.* St. Paul Water Commissioners, 168 U. S., 349 ..... 94, 95, 96, 99
Seaboard Airline Ry. Co. *v.* U. S., 261 U. S., 299 73

The Montello, 20 Wall., 430 99
The Daniel Ball, 10 Wall., 557 101

United States *v.* Chandler Dunbar Co., 229 U. S., 53, 100, 230
United States *v.* Cress, 243 U. S., 316 100
United States *v.* Rio Grande Irrigation Co., 174 U. S., 690 ..... 96, 99, 102
United States v. Bellingham Bay Boom Co., 176 U. S., 211 113

Wilson *v.* New, 243 U. S., 332 116
Wisconsin *v.* Illinois, 278 U. S., 367 .....8, 67, 102, 107
Wyoming *v.* Colorado, 259 U. S., 419 .....8, 63, 64, 65

Other Federal Cases

Cohen *v.* United States, 162 Fed., 364 105

Jolly *v.* Terre Haute Drawbridge Co. Fed. Cases, 7441.. 100

Texas & P. R. Co. *v.* New Orleans, 40 Fed., 111 100

United States *v.* Adair, 152 Fed., 737 116

INDEX OF AUTHORITIES—*Cont'd*

Page

United States *v.* Burlington & H. County Ferry Co., 21 Fed., 332 101

Willimet Iron Bridge Co. *v.* Hatch, 19 Fed., 347 101

State Court Cases

Aetna Mills *v.* Brookline, 127 Mass., 69 60
Aetna Mills *v.* Waltham, 126 Mass., 422 60
Agawam Canal Co. *v.* Edward, 36 Conn., 476 .....58, 65
Amsterdam Knitting Co. *v.* Dean, 43 N. Y. S., 29 131
Anthony *v.* Lapham, 22 Mass., 175 .....58, 65
Atkins *v.* Boardman (Mass.), 37 Am. Dec., 100 63

Bradshaw *v.* Mill Co., 52 Minn., 59 96
Buddington *v.* Bradley, 10 Conn., 212 .....58, 65

Carey *v.* Daniels, 46 Mass., 236 .....57, 138
City of Richmond *v.* Cheatwood, 107 S. E., 830, 130 Va., 76 47
City of Tulsa *v.* Grier, 246 Pac., 753, 114 Okla., 93 47
Colburn *v.* Richards, 13 Mass., 422 .....58, 65
Corning *v.* Troy, etc., Factory, 39 Barb., 311 131
Crownen *v.* Wellsville Water Co., 3 N. Y. S., 177 131

Elliott *v.* Fitchburg R. R. Co., 64 Mass., 191 .....58, 65

Harding *v.* Stamford Water Co., 41 Conn., 91 59
Herminghaus *v.* Southern California Edison Co., 252 Pac., 607, 200 Cal., 81 47
Hickok *v.* Hine, 23 Ohio State, 523 101
Hollister *v.* Union Co., 9 Conn., 435 .....57, 138
Holsman *v.* Boiling Spring Bleaching Co., 14 N. J. Eq., 335 131
Home for Aged Women *v.* Commonwealth, 202 Mass., 422 92
Johnson *v.* Jordan, 43 Mass., 234 .....57, 58, 65

INDEX OF AUTHORITIES—*Cont'd*

Page

King v. Tiffany, 9 Conn., 162 .....57, 58, 65

Lynfield v. Peabody, 219 Mass., 322 60

Manville v. City of Worcester, 138 Mass., 89 76
Miller v. Mendenhall, 43 Minn., 95 96
Moulton v. Newburyport Water Co., 137 Mass., 163 ..57, 59

Neaderhouser v. State, 28 Ind., 257 101
Nemasket Mills v. Taunton, 166 Mass., 540 ....58, 91, 139

Pratt v. Lamson, 84 Mass., 275 57
Proprietors of Mills v. Braintree, 149 Mass., 478 59

Stanton v. Ambrey 46 Conn., 595 72
Soules v. Northern Pacific R. R. Co., 34 N. D. 7,
L. R. A. 1917 A., 501 47
Stevens v. Worcester, 219 Mass., 128 59
Stratton v. Mt. Hermon Boys' School, 216 Mass., 83 .. 60
Sweet v. State of New York, 129 N. Y., 316 90

Thomson v. La Fetra, 183 Pac. 152, 180 Cal., 771 47
Thompson v. New Haven Water Co., 86 Conn., 597
58, 91, 139

Van Etten v. New York City, 226 N. Y. 483 130

Wadsworth v. Tillotson, 15 Conn., 365 .....58, 65
Waterbury v. Pratt Bros., 76 Conn., 435 .....58, 65
Water Commissioners v. Perry, 69 Conn., 461 .....63, 77
Wellington v. Rawson, 231 Mass., 189 .....63, 77
Whitney v. Fitchburg R. R. Co., 178 Mass., 559 123

Other Authorities

Blackstone's Commentary, Book 2, page 18 90
Bouvier's Law Dictionary 47
40 Cyc., 558 92

INDEX OF AUTHORITIES—*Cont'd*

	Page
3 Ency. U. S. Reports, page 970	66
1 Farnham on Water and Water Rights, page 67, section 15	94, 101
1 Farnham on Water and Water Rights, page 47, section 9	94
2 Farnham on Water and Water Rights, section 497	63
High on Injunctions, 4th Edition	130
8 Harvard Law Review, 138	76, 126
3 Kent's Commentaries, page 439	90
3 Kent's Commentaries, page 427	96
27 R. C. L., 1371	94

CONSTITUTION OF THE UNITED STATES

Article I, Section 1	232
Article I, Section 10	232

UNITED STATES STATUTES

Rivers and Harbors Act, March 3, 1899, Section 9	108
Rivers and Harbors Act, March 3, 1899, Section 10, 108, 112 114	
Act of August 8, 1917 (40 Stat., 266, Sec. 5)	235
Act of April 8, 1918 (40 Stat., 515)	235
Act of July 11, 1919 (41 Stat., 158)	235
Joint Resolution of March 4, 1921 (41 Stat., 1447)	235
Act of August 19, 1921 (42 Stat., 171)	235
Joint Resolution of September 22, 1922 (42 Stat., 1058)	235
Act of January 29, 1925 (43 Stat., 796-798)	235
Act of March 4, 1925 (43 Stat., 1268)	236
Act of March 8, 1926 (44 Stat., 195)	236
Act of April 13, 1926 (44 Stat., 247, C. 129)	236
Act of July 3, 1926 (44 Stat., 831, C. 754)	236
Act of February 26, 1927 (44 Stat., 1247, C. 216)	236

UNITED STATES STATUTES—*Cont'd*

Page

Joint Resolution, March 3, 1927 (44 Stat., 1403, C. 382) 236
Act of March 2, 1929 (45 Stat., 1502, C. 520) 236
Act of March 2, 1929 (45 Stat., 1502, C. 521) 237
Act of March 2, 1929 (45 Stat., 1503, C. 522) 237
Act of March 2, 1929 (45 Stat., 1517, C. 538) 237

MASSACHUSETTS STATUTES AND REPORTS

1926 Chapter 375 (Ware River) ..20, 23, 41, 69, 74, 126
1927, Chapter 321 (Swift River) ..20, 23, 41, 69, 74, 126
1895, House Document 500—Report of joint board of health 174
1922, House Document 1550—Report of joint board on water supply 174
1926, House Document 900—Report of the Metropolitan Water Supply Investigating Commission 174
1895, Chapter 488 (Metropolitan Water District) 20

CONNECTICUT STATUTES

1925, Chapter 143—An Act Concerning the Pollution of Water and Creating a State Water Commission ... 159

In the
Supreme Court of the United States

OCTOBER TERM, 1930

Original No. 12

STATE OF CONNECTICUT

v.

COMMONWEALTH OF MASSACHUSETTS

IN EQUITY

BRIEF FOR THE COMPLAINANT IN SUPPORT OF EXCEPTIONS TO REPORT OF SPECIAL MASTER

II. PLEADINGS

This is an action brought under the original jurisdiction of the Supreme Court of the United States by the State of Connecticut, Complainant, to enjoin the Commonwealth of Massachusetts from abstracting waters from tributaries of the Connecticut River, a navigable stream which flows through Massachusetts and Connecticut to Long Island Sound, an arm of the Atlantic Ocean. The bill was filed by leave of the Court January sixteenth, nineteen twenty eight.

COMPLAINT

The Bill of Complaint alleges:

1. Recognition in Connecticut and Massachusetts of the Common Law doctrine of riparian rights as that is understood to give the riparian owners the right to the undiminished flowage of all streams, which flowage is to be free from contamination or burden of any kind placed upon it by the other riparian owners. (P. 3, par. 1.)

2. That the State of Connecticut is the owner of a tract of land on the west bank of the Connecticut River at Middletown upon which is located the Connecticut Hospital for the Insane. (P. 6, par. 2.)

3. That the State of Connecticut appears as the proprietor of riparian lands, as the owner of the bed of the Connecticut River within the State of Connecticut and as *parens patriae*. (P. 6, par. 1, 2, 3.)

4. That the Connecticut River is a navigable body of water and that the Ware and Swift and other tributaries contribute to the navigable capacity of the Connecticut River. (Pp. 2, 3, 4, 5.)

5. That the effect of the action complained of on the part of Massachusetts will be to take and remove water which contributes to the navigable capacity of the Connecticut River entirely out of the watershed and forever prevent it from continuing to contribute to the navigable capacity of the Connecticut River. (P. 9, par. 1.)

6. That such action will take away the flood waters and thereby cause a damage to agricultural interests in Connecticut. (P. 7, par. 1, 2.)

7. That the Connecticut River is now heavily burdened with sewage and offensive matters discharged into it within the limits of the Commonwealth of Massachusetts and that the burden is now so heavy that it requires all of the water that naturally comes down the river to take care of it and prevent it from becoming a nuisance and a menace to public health in Connecticut. (P. 8, par. 1.)

8. That such taking will destroy property and property rights of the State of Connecticut and of citizens of the State of Connecticut located within its territorial limits and cause injury for which there is no adequate remedy at law. (P. 9, par. 2.)

9. That Massachusetts threatens and intends to take property of the State of Connecticut and to destroy and irreparably damage property of the State of Connecticut and its citizens without due process of law. (P. 11, par. 2.)

10. That the present diversion is only a portion of a general plan adopted by Massachusetts which includes the acquisition of the waters of other tributaries of the Connecticut River. (P. 10, par. 1, 2.)

ANSWER

Massachusetts in an answer to the bill:

1. Pleaded necessity to secure additional waters for domestic purposes and alleged that this additional water can be obtained from no source in the Commonwealth of Massachusetts except from the watershed of the Connecticut River as has been authorized in legislation with respect to waters of the Swift River and the Ware River. (Reprint of Answer, paragraph 25; First sub-Division, pp. 30, 31.)

2. Admitted that the Commonwealth of Massachusetts in accordance with the provisions of the said acts of the Great and General Court of the Commonwealth, proposes to divert the flood waters of the Ware River, as defined in said acts, and proposes to construct, by building dams in the valley of the Swift River, a reservoir which will cover with water a large area in the valley of the Swift River. (Reprint of Answer, paragraph 17, pp. 20, 21.) That unless enjoined from so doing, it intends to proceed with the work authorized by the Great and General Court of Massachusetts in the Acts of 1926, Chapter 375, and the Acts of 1927, Chapter 321.

3. Denied that the waters of all or any of the said tributaries are necessary to maintain and preserve the flow of the Connecticut River. (P. 10, par. 7, p. 14, par. 14.)

4. Averred that by the law of both the Commonwealth of Massachusetts and the State of Connecticut owners of riparian lands are entitled to make reasonable and equitable use of the waters of streams flowing by or through their land provided that such use is not inconsistent with a similar reasonable and equitable use of the said stream by lower riparian owners. (Reprint of Answer, paragraph 4, p. 5.)

5. Denied that it was necessary to obtain a permit from Congress, the War Department, the Secretary of War, or the Chief of Engineers for the erection of any structures as such in a non-navigable river and stream and denied interference with interstate commerce or that there was any necessity of permission being obtained from the War Department or the Secretary of War before any of the Acts and things referred to in the bill of complaint may be lawfully done. (Reprint of Answer, paragraph 5, p. 6.)

6. Alleged the making of a formal application to the War Department for permission to divert water from the Swift and Ware Rivers in accordance with the terms of the Acts of the Great and General Court of Massachusetts. (P. 7, par. (a).)

7. Alleged the receipt of communications from War Department that no objection would be interposed to diversion of the Ware and Swift within certain limits. (P. 7, par. (b); p. 8, par. (c); Appendix B, p. 81; Appendix C, p. 102.)

8. Averred the existence of an adequate remedy at law for the State of Connecticut and its citizens for any injury caused by diversion. (Reprint of Answer, p. 31, par. 2.)

9. Averred that the diversion will not materially diminish the flow of the Connecticut River and that the project is a reasonable use of the waters of the Swift and Ware Rivers. (Reprint of Answer, p. 14, par. 14; p. 18, par. 16.)

10. Averred that Connecticut and lower riparian owners will benefit from release of waters during low stages of the stream flow. (Reprint of Answer, pp. 14, 15, par. 14; p. 22, par. 17.)

11. Denied that the diversion would in any way affect the navigable capacity of the Connecticut River. (P. 12, par. 11.)

12. Denied that the diversion would in any way adversely affect the fertility of the soil on the banks of the Connecticut River. (P. 14, par. 14.)

13. Denied that the present normal flow of the Connecticut River was necessary to dilute and carry away the sewage discharged into it. (P. 28, par. 22.)

In due course the matter was referred to the Honorable Charles W. Bunn as Special Master, who, acting under the Order of this Honorable Court and in compliance with its rule, heard the evidence and made and filed his Report, together with his recommendations.

Massachusetts waived its right to file any Exceptions to the Report of the Special Master and the matter is now before the Court on the Bill of Exceptions filed by the State of Connecticut.

III. JURISDICTION

As sustaining the plaintiff's contention that this Court has jurisdiction and that a justiciable controversy is presented, we refer to

Cohens *v.* Virginia, 6 Wheat., 263.
Missouri *v.* Illinois, 180 U. S., 208; also 200 U. S., 496.
Kansas *v.* Colorado, 185 U. S., 125.
New York *v.* New Jersey, 256 U. S., 296.
Wyoming *v.* Colorado, 259 U. S., 419.
Pennsylvania *v.* W. Virginia, 262 U. S., 553.
Georgia *v.* Tennessee Copper Co., 206 U. S., 237.
Wisconsin *v.* Illinois, 278 U. S., 367.

IV. STATEMENT OF THE CASE

The motions to dismiss the answer and to strike out portions of the answer which were before this court a year ago were denied without prejudice. Such disposition of these motions leaves all of the questions of law therein raised to be determined upon the facts which have been presented in this case.

The Commonwealth of Massachusetts claims that the jurisdiction of this Court partakes that of an arbiter of controversies between states and is not confined to the administration of law and equity as it exists in the ordinary judicial branch of government, and therefore this case cannot be considered solely from the standpoint of a controversy in which principles of law and equity are to obtain but the facts presented must also be considered from the viewpoint of policy and statesmanship rather than from the viewpoint of purely legal principles.

This conception of the jurisdiction and the function of this court are not conceded by the State of Connecticut and we do not anticipate that such a conclusion will be the final decision of the court. However, for the purposes of this case, it is incumbent upon us to present our case with the idea that this may be the ultimate conclusion of the Court. Consequently our presentation of the case has taken on a much broader aspect than would otherwise have been the situation.

The case of the State of Connecticut will be presented in the following order with an extended discussion of each subject in detail. To give the Court a general idea of the controversy as we view it, we will first discuss briefly what we claim to have proven under each of the following headings:—

Massachusetts Project
Navigation
Power
Agriculture
Pollution
Fish Life
Available Supplies in
Eastern Massachusetts
Necessity

MASSACHUSETTS PROJECT

By legislative acts of the Commonwealth of Massachusetts a special commission known as the Metropolitan District Water Supply Commission has been created and charged with the duty of taking certain specified waters of the Ware and Swift Rivers located within the Connecticut River watershed in Massachusetts and transporting them into an entirely different watershed for the purpose of supplying the people residing in northeastern Massachusetts with water. It is also authorized to acquire by purchase or eminent domain any other waters it may deem necessary or advisable for the same purpose except the Millers River.

It is also instructed to construct tunnels, aqueducts, dams and reservoirs of sufficient size and dimensions to carry out this purpose and these are to be in substantial accordance with House Document No. 1,550 of 1922. (Ex. C-1.)

The present taking of the Ware and Swift Rivers is a determinable amount and is in excess of 2% of the average flow of the Connecticut River at the Connecticut-Massachusetts state line. It takes not only the so-called flood flows of the two streams but also a substantial percentage of the ordinary and low flows of both streams.

Work on the tunnel and diversion dam required to take the Ware River has been started and continued since this case was presented to this Court and the purchase of land for the Swift River development has also been accomplished during this period. So that all moneys have been expended regardless of the fact that this case has been pending and was not expended prior to the action of Connecticut.

The project is the result of years of study and reports by several eminent Engineers and Commissions representing the Great and General Court of Massachusetts and is the consummation of a policy recommended in 1895 to ultimately supply eastern Massachusetts with water from the Connecticut River watershed.

The policy is based upon the assumption that no additional water is to be taken from any eastern streams and where such streams are now used a portion of them are to be abandoned as sources of water supply when the western waters have been made available for use.

The streams in Eastern Massachusetts have been allowed to become polluted by both municipal sewage and industrial waste and it is the intention of the Commonwealth of Massachusetts to permit this condition to continue and refuse to allow the use of those waters for a domestic water supply.

It is the intention of the Commonwealth of Massachusetts to secure its future water supply for all of northeastern Massachusetts from the Connecticut River watershed and plans for such additional diversions of water must be started by the year 1955 or 1960 because the supplies must be obtained and available by the year 1970.

While for navigation purposes only the War Department of the United States has indicated that the diversions proposed by the legislation of Massachusetts should be modified so that the average diversion will be reduced to at least 2% of the average flow of the Connecticut River at the Connecticut-Massachusetts state line, this proposed modification has never been reported to the Great and General Court of Massachusetts and no modification of its legislation has been made.

Even under the proposed modifications of the War Department, the diversion of the Ware and Swift waters will be determinable and will constitute a taking of the property rights of the State of Connecticut and of its citizens.

NAVIGATION

Navigation by both pleasure and commercial craft actually exists between Hartford and Holyoke. It requires at least 4½ feet of water on the Hartford gauge to navigate. Even under the War Department's suggestions there will always be a diversion at that gauge height and such navigation will be adversely affected.

Between Hartford and Long Island Sound there is substantial commercial navigation. The United States by act of Congress has established a project depth of 12 feet when the Hartford gauge is at 2 feet and a channel 100 feet wide but this project has never been completely maintained either as to the width or depth of the channel.

This navigation will be affected by any diversion of water. When the Hartford gauge is at 2.1 feet or above no protection will be afforded by the War Department's suggestions as to the Swift River diversion.

Although the War Department's suggestions undertake to increase the flow in the Connecticut River when the Hartford gauge is 2.1 feet or less, actually there will be diversion instead of increase a substantial portion of the time.

The adverse results to navigation due to the delays, damage to the hulls of vessels, and the necessary lightening of cargo

are all due to lack of water and are reflected in the transportation rates charged to the consumers.

POWER

There is one power plant now existing on the Connecticut River a few miles below the Connecticut-Massachusetts state line. It is susceptible of increased development either by an enlargement of its present facilities or by the construction of a new dam and power development.

A new site has been determined upon and the Federal Power Commission has granted a permit for the new development after finding that the company has complied with the laws of both Connecticut and Massachusetts and that it is able to carry out the proposed plans.

The proposed diversion under the Massachusetts legislation will reduce the productive capacity of the plant 1% and under the War Department's suggestions there will be a reduction of ¾ of 1%.

AGRICULTURE

During all of our history, Connecticut farmers in the Connecticut meadows have depended upon the fertilizing effects of the high flows of the river to provide them with a quality of hay which cannot be produced upon the higher ground. This has been accomplished without the use of fertilizer due to the deposits of silt from the inundations at particular times of the year. Two crops of hay are produced each year on about 9,500 acres of such land. In addition there are some 1,650 acres devoted to other crops besides hay. The rights to these waters have always been considered as vested property rights by our courts.

The greatest amount of water proposed to be diverted will be taken at the time when these lands need it. There will be a reduction of from 3 to 6 inches even under the War Department's suggestions.

The injury occurs to such portions of the land as is not inundated and also all land which is covered will be injured because of the loss of fertilizing material contained in the amount of water removed.

POLLUTION

The quality of the water of the Connecticut River, as it enters Connecticut from Massachusetts at the State line, is highly polluted. During portions of the year it passes the border line between being an avowed nuisance and not. The river being so close to becoming a public nuisance, any taking of water will not only make conditions worse, but may convert a possibility into an actuality. The water, as delivered from the Commonwealth of Massachusetts, is so highly polluted that it will be extremely difficult to make it available as a part of the water supply of the Metropolitan District of Hartford; it is unsafe at present for bathing; and every year it is growing worse. With the increasing population of Springfield, West Springfield, Chicopee, Holyoke, and other municipalities in Massachusetts adding constantly to the burden of the river in disposing of their sewage and industrial wastes, it will be dangerous to Connecticut to permit a reduction in the stream flow while such conditions exist.

Connecticut has a definite policy relating to its water having regard to the future needs of the State. By its legislation

it has inaugurated the policy of removing from its streams as fast as possible all forms of pollution, whether it be in the form of sewage or industrial wastes. The State itself has provided for the sewage of its institutions, and definite plans have been formulated to secure the purification of the Connecticut River by Hartford and other municipalities upon the stream. This is not based solely upon a public health basis. It is an economic policy. Connecticut realizes that the future will necessarily disclose the need for water by our several communities; that if the whole State is to grow, one portion cannot do so at the expense of the other; that, to avoid this, the waters of each locality should be cleaned up so that when the need arises water can be made available with the least possible expense for treatment. In the opinion of our State Water Commission, Connecticut cannot afford to permit the taking of any water now flowing into the State, if its municipalities and particularly Hartford are to be protected in their future requirements.

FISH LIFE

The condition of the water in the Connecticut River as it is delivered to us by Massachusetts is such that in times of low flow it is on the border line as to fish life—they must either migrate or die. With conditions steadily becoming worse by added pollution with increased population, we cannot afford to permit any loss of water.

The period of greatest diversion occurs when the high flows are needed to flush out the stream and furnish the fresh water needed to attract the fish to the upper portions of the river.

AVAILABLE SUPPLIES

While no part of Connecticut's case, the answer of Massachusetts affirmatively alleged that because there were no avail-

able supplies existing in eastern Massachusetts it was necessary to take the waters of streams in the Connecticut River watershed. To rebut this claim evidence was produced to show otherwise.

Exhibits "C-1," "C-2," and "C-3," being official reports made at the behest of the Great and General Court of the Commonwealth, were carefully and elaborately prepared by some of the best water supply engineers of the country. Each of them shows ample water supplies in eastern Massachusetts, admits that they are available and usable and some of them are recommended for development.

In addition our own engineers verified the existence of these supplies and suggested possible plans for their development. Not satisfied with our engineers' plans, Massachusetts engineers produced what they considered was a better plan which would produce as much water as is contemplated to be procured from the present Ware and Swift development.

If precluded from taking the waters of the Connecticut River watershed, there is no question but there is ample water physically present in eastern Massachusetts which can be developed and used.

NECESSITY

It is claimed by Massachusetts that it is necessary to take the waters of the Ware and Swift Rivers which are now being used by Connecticut and its citizens because of a lack of available water in eastern Massachusetts. It is further claimed that this necessity is of such high importance as to warrant this Court in discarding the common law riparian doctrine which has always existed in both Connecticut and Massa-

chusetts and substituting for it a principle of law and equity which has heretofore been unknown. If this is correct, it becomes of first importance to find the true meaning of the term "necessity."

Apparently its ordinary meaning is not intended to apply. All of the Massachusetts experts agreed that if it became impossible to acquire the Ware and Swift waters that it would be possible to supply eastern Massachusetts with water from their own sources of supply but if the Ware and Swift could be obtained it was preferable to take them.

It is conceded that there are two sources of supply available which have not as yet been developed and which will yield 85 million gallons per day, an amount which is more than half the present supply of the Metropolitan District. So that a present necessity cannot be said to exist.

Exhibits "C-1," "C-2" and "C-3" before referred to, all state that there are other undeveloped sources in eastern Massachusetts which can be made available but which will require modern scientific treatment to make them usable.

That these sources of water supply require treatment is because Massachusetts has permitted them to become polluted, has no expectation of either cleaning them up or preventing further pollution and intends their removal from potential sources of a water supply.

Necessity from the Massachusetts viewpoint apparently means that it has a choice of what waters it will preserve for domestic use and what it will permit to be destroyed for such use regardless of where they may be situated or who may be now using them and whether the people affected are its subjects or not.

THE REAL ISSUE

From our point of view this is a case involving the future of two States of the Union. It is not altogether a problem of the present. We do not believe that if Massachusetts is once permitted to take these waters, they will ever be returned no matter how much conditions may change during the next century. We do not believe that the present taking represents all that Massachusetts will ever take. At best it represents an additional supply for a few years, and must be followed by a demand for more. When that time comes we do not feel too confident that it will be refused. The opening wedge has been driven, and there is no return. This is the only possible opportunity Connecticut can have to thoroughly present and try out its claim to protection for the present and for the future.

While it may seem that the issues here presented might better form the subject of negotiations between the two States looking to a possible interstate compact, this has not been the policy adopted by the Commonwealth. The legislation was passed, the work started, and the only recourse left to Connecticut was to present its case before the Supreme Court of the United States. Under the Constitution this tribunal is the first, the last and the only protection which Connecticut can seek to protect what it believes to be the rights of the State and of its citizens.

FOLD-OUT IS TOO LARGE TO BE FILMED

V. MASSACHUSETTS PROJECT

Massachusetts is naturally divided into two watersheds

To enable the Court to have knowledge of the topography of the territory involved, we have prepared an adaptation of Ex. C-10, and file herewith a map entitled "Map Showing Watercourses in Massachusetts and Connecticut, and East-West Drainage Divide in Central Massachusetts," showing the States of Massachusetts and Connecticut with their rivers and water courses and indicating the location of the range of hills which divides Massachusetts' streams into two watersheds.

The Connecticut valley is separated from the eastern portion of Massachusetts by a range of high hills or mountains extending generally north and south from New Hampshire to Connecticut.

The Western Section of Massachusetts lies in the Connecticut Valley

The Connecticut River is a navigable, interstate stream, rising in the Connecticut lakes of northern New Hampshire, flowing southward between New Hampshire and Vermont across Massachusetts and Connecticut to Long Island Sound (Report of Special Master, p. 2). It is the largest river in New England, about 345 miles long, and the drainage area within the Commonwealth of Massachusetts is approximately 3,130 square miles. Four rivers—the Millers River, the Deerfield River, the Chicopee River, and the Westfield River,—flow into it in Massachusetts and contribute to the navigable capacity of the Connecticut River. The Chicopee River is formed by the confluence of three principal tributaries, the Swift River, the Ware River, and the Quaboag River.

The Eastern Rivers drain into the Atlantic Ocean in Massachusetts

The main streams draining into the Atlantic Ocean in the Commonwealth of Massachusetts include the Neponset, the

Charles, the Ipswich and the Merrimac Rivers. The Merrimac is the second largest river in New England. The present Boston Metropolitan water supplies are developed on two tributaries of the Merrimac—the Nashua and the Sudbury. In addition to these two, the Merrimac tributaries in Massachusetts include the Assabet which, together with the Sudbury, forms the Concord River and flows into the Merrimac at Lowell, and the Shawsheen which flows into the Merrimac at Lawrence.

The Metropolitan Water District lies in the Eastern watershed

In order to provide the inhabitants of Boston and certain of the surrounding cities and towns in the eastern watershed with a suitable supply of water for domestic purposes, the Great and General Court of Massachusetts created the Metropolitan District Water Supply Commission (Acts of 1926, Chapter 375 and Acts of 1927, Chapter 321). This Commission was directed to secure a supply of water to be distributed by the Metropolitan District Commission which absorbed the Metropolitan Water District, which was created by the Legislative Department of the Commonwealth of Massachusetts in 1895 (Acts of 1895, Chapter 488). The legislation creating and governing the Metropolitan Water District provided that towns and cities located in whole or in part within ten miles of the State House in addition to those named in the original Act could become members of the District for the purpose of receiving water supplies and other service from the District under conditions which varied to meet the situation.

We have reproduced and file herewith a map reproduced from Exhibit "D-13 AA," entitled "Cities and Towns with Expected Demand on Metropolitan District Water Supply," which shows:

1. Twenty cities and towns comprising the present Metropolitan Water District.

FOLD-OUT IS TOO LARGE TO BE FILMED

2. Thirteen cities and towns eligible but not at present members of the District; Lynn and Saugus excepted.

3. Ten cities and towns just outside the ten mile limit of membership and not now eligible to become members of the District.

4. Twenty cities and towns further west which have rights in District sources of water supply but which are not eligible to become members of the District.

5. Eighteen cities and towns comprising the Ipswich group. (Colored orange.)

6. Thirty-seven cities and towns in Northeastern and Central Massachusetts not included in the other five groups. (Colored green.)

The Plate contains an explanatory key.

Legislative Acts Authorizing Diversions include other Waters besides Ware and Swift Rivers

By legislative act the Metropolitan District Water Supply Commission has been specifically directed for and on behalf of the Commonwealth of Massachusetts to take the waters of the Ware and Swift Rivers, which are normally a part of the watershed of the Connecticut River, and transport them for use in eastern Massachusetts into a different watershed which drains into the Atlantic Ocean. The amount to be taken from these two streams under the legislation will be sufficient to provide the people of eastern Massachusetts with about 205,000,000 gallons of water per day.

It was found by the Special Master (Page 5), that the Massachusetts acts do not authorize the diversion of any waters other than the Ware and Swift. The complainant has excepted to this finding (Exception 6 and 17), it being claimed that the act relating to the Swift River (Acts of 1927, Chap. 321) does permit other diversions with the exception of the Millers River.

Section 2 of that Act (Page 54 Reprint of Answer), provides:

> "The works authorized by this act shall be of such dimensions, capacities and areas as the commission may determine, and may from time to time be enlarged or modified as the commission may determine; and may be so constructed, enlarged or modified as to allow for a future increase in capacity to take care of the diversion of other streams in substantial accordance with the plans and recommendations of the joint board on water supply needs and resources of the commonwealth as contained in its report to the general court in nineteen hundred and twenty-two printed as house document fifteen hundred and fifty of that year; but nothing in this act shall be held to authorize any taking or diversion of any waters of the Millers river watershed or to affirm the intention of taking at any future date any unutilized flood waters of said Millers River."

Section 4 of the same act (Page 55, Reprint of Answer) provides:

> "Section 4. For any of the purposes of this act, or for the further protection of the purity of the waters to be diverted under this act, or for the purpose of providing for a future increase in the capacity of the Swift river reservoir, the commission on behalf of the commonwealth may, at any time and from time to time, take by eminent domain or acquire by purchase

or otherwise, such lands, waters, water rights, easements and other property or interests in property, including any cemetery, as it may deem necessary or desirable; provided, however, that the amount of water to be let down into the Swift river as provided in section one of this act shall not be diminished by any taking under this act."

Legislative Acts concerning Construction of Works intend further Diversions

Section 1 of the Ware River Act (Acts of 1926, Chap. 375), (Page 37 Reprint of Answer), provides:

"Said works, and particularly the aqueduct or tunnel required for said diversion, shall be constructed at such grade and of such capacity and otherwise so that they can be used as a part of works that shall later be constructed for diverting into the Wachusett reservoir the waters of the Swift river, in substantial accordance with the plans and recommendations of the joint board on water supply needs and resources of the commonwealth as contained in its report to the general court in the year nineteen hundred and twenty-two, printed as house document number fifteen hundred and fifty of said year. All plans, maps and records of said joint board relating to the proposed extension to the Ware, Swift and Millers rivers shall be made available to the commission, and the department of public health shall, at the expense of the commission, furnish it, on request, with any information relative to said projects that said department may have in its possession."

Also Section 2 of the Swift River Act (Acts of 1927, Chap. 321), (Pages 54 Reprint of Answer), quoted on the previous page makes provision for further diversion.

Legislative reports concerning size and character of works

The project and plan which is now being carried out was outlined generally in Exhibits "C-1" and "C-3," House Documents Nos. 1550 of 1922 and 500 of 1895, reports to the Great and General Court of the Commonwealth of Massachusetts by commissions appointed to study and decide upon a future policy for a water supply for the Metropolitan District. It is significant that the plan now being carried out had its inception as long ago as 1895 (Report of Special Master, p. 29).

In Ho. Doc. 500 of that year (1895), a plan was presented to the Great and General Court for a water supply for what is now the Metropolitan District. The plan was to take over the existing water supply of the City of Boston, coming from Lake Cochituate and the Sudbury River and supplement these by constructing an aqueduct (Wachusett aqueduct) westward from the Sudbury River to the Nashua River to bring the water of the Nashua to the Metropolitan District. A dam at Clinton, Mass., on the Nashua River to form a reservoir (Wachusett Reservoir) was part of the plan. This water supply from the Nashua River was expected to provide for a number of years in the future without any additional sources, but the report (Ho. Doc. 500, 1895, Ex. "C-3") looked ahead to the time when the safe capacity of the Nashua River supply should be exceeded, and at p. xvi comments thereon as follows:

> "The very great merit of the plan now submitted is to be found in the fact that this extension of the chain of the metropolitan water supplies to the valley of the Nashua *will settle forever the future water policy of the district*, for a comparatively inexpensive conduit can be constructed through to the valley of the Ware River, and beyond the Ware River lies the valley of the Swift; and, in a future so far distant that we do not venture to give a date to it, are portions of

> the Westfield and Deerfield rivers, capable, when united, of furnishing a supply of the best water for a municipality larger than any now found in the world." (Italics ours.)

This report transmits the report of the Chief Engineer of the State Board of Health from which we quote (Exhibit "C-3," p. 69-70):

> "The cost of adding the tributaries of the Assabet River and the Ware River will be comparatively small; and if the population of the Metropolitan District should ever become so large as to require the addition from time to time of the other streams, the cost would not be large in proportion to the greatly increased population to be supplied at the time."

A Joint Board, consisting of the State Department of Public Health and the Metropolitan District Commission, was authorized under the provisions of Chapter 49 of the Resolves of the year 1919, to make an investigation of the water supply needs and resources of the Commonwealth, with particular attention to those of the Metropolitan District, and in 1922 filed a report, Ho. Doc. 1550 (Exhibit "C-1"), which contained an elaboration of the plan suggested and recommended by the 1895 report (Report of Special Master, p. 29). This report comments upon the 1895 report as follows: (Exhibit "C-1," p. 16)

> "In 1895 chief reliance for the future supply of the district was placed upon the use of the Ware River, and after that, the Swift River. We believe that these ideas were sound, and our own recommendations are based upon them. Both of these sources of supply are sure to be needed. Two courses of action are open. One is to develop a supply from the Upper Ware River watershed, and later an independent supply from the Swift River, carrying both waters through separate tunnels to the Wachusett Reservoir. The other is to

> construct a single tunnel from the Wachusett Reservoir to the Swift River, crossing under the Ware River and so designed that it can be built in two installments, the first to take the Ware River supply, and the second to take both the Ware River and the Swift River. It is our opinion that the latter plan is much the better project, and it is the plan which we recommend."

Concerning the further diversion of tributaries of the Connecticut River, and its relation to the size of the works proposed, the Chief Engineer states at page 197 of Exhibit "C-1" the following:

> "The proposed reservoir in the Swift River valley, with a drainage area of 186 square miles and a storage capacity of 410,000,000,000 gallons, *would be open to the criticism that it was disproportionately large* to the size of its drainage area were it not for the fact that the plan contemplates the storage in this reservoir not only of the water of the Swift River, but also that from large areas in the watersheds of the Ware and Millers rivers in the earlier years, together with a possible subsequent extension to the Deerfield River and the addition of other areas as future circumstances may require." (Italics ours.)

The works of construction which the diversion of the Ware and Swift Rivers embodies are:

(1) A tunnel from the Ware River at Coldbrook eastward to the Wachusett Reservoir, 12 miles long, of horseshoe shape, 12 feet 9 inches high by 11 feet wide, having a cross section equivalent to the area of a circle with an internal diameter of 12 feet 9 inches, to be lined throughout with concrete, and having a daily capacity of 900,000,000 gallons. (Winsor, J. S. E.* 5.) A tunnel of 12 feet, 9 inches diameter was recommended in Ho. Doc. 1550 (Exhibit "C-1," p. 202).

* Joint Summary of Evidence.

(2) A diversion dam at Coldbrook on the Ware River to turn the water of this river into the tunnel (Winsor, J. S. E. 6).

(3) A continuation of this tunnel from the Ware River westward to the Swift River, a distance of approximately 10½ miles, of the same dimensions and capacity as that from the Ware River to the Wachusett Reservoir, making a total capacity of both tunnels of some 1,900,000,000 gallons a day. (Winsor, J. S. E. 5.)

(4) A temporary diversion dam in the valley of the Swift River before the main reservoir is built. This will permit diversion of Swift River water before construction of the main dams is finished and enable postponement of heavy expenditures on the main reservoir. (Winsor, J. S. E. 6, 7.)

(5) A reservoir in the valley of the Swift River made by the erection of two dams, one on the main stream and one on the side of the proposed reservoir, for the purpose of storing the Swift River water and the surplus Ware River water. The exact capacity of the reservoir has not been determined upon but three elevations of the dam and three corresponding capacities have been considered—first, a dam 500 feet above mean low water in Boston Harbor, having a capacity of 215,000,000,000 gallons—second, one at 515 feet, having a capacity of 318,000,000,000 gallons—and one at an elevation of 530 feet, having a capacity of 420,000,000,000 gallons. (Winsor, J. S. E. 8.) House Document 1550 (Massachusetts) of 1922, the plans and recommendations of which are to be carried out in the building of these works, recommended a reservoir of 410,000,000,000 gallons capacity.

(6) The acquisition by purchase or condemnation for reservoir purposes of approximately 90 square miles of land.

(Winsor, J. S. E. 9.) The area flooded by the reservoir, if built to the maximum height considered, would be 39 sq. mi. (Ex. "C-1," p. 197.)

(7) A power plant at the Wachusett end of the tunnel for the generation of hydro-electric power by the diverted water. (Winsor, Record, 199.) (Ex. "C-1," p. 206.) Exhibit "C-1" also points out (p. 206) that Ware and Swift Rivers water will augment the supply of power now available at the Wachusett dam and the Sudbury No. 5 dam. This power is now sold to public service corporations. (Winsor, Record, 199.)

The tunnel from the Wachusett Reservoir west to Coldbrook on the Ware River has a capacity of approximately 900,000,000 gallons per day and is of greater size than would be needed to carry away the water of the Ware River alone. This tunnel, as was suggested in Exhibit "C-1," and testified to, is large enough to take care of future diversions, not only from the Ware and Swift Rivers, but other rivers in the Connecticut watershed, including the Quaboag, Millers, Deerfield, Westfield and others. The reason for the building of these large tunnels, and the construction of this large storage reservoir on the Swift River, both so greatly in excess of what is required to adequately develop the Ware and Swift Rivers, is because the future water supply for eastern Massachusetts is to come from the Connecticut River watershed. This not only appears in the several reports from 1895 to the present time, but it was also testified to by the expert engineers called by the Commonwealth of Massachusetts who all agreed that the logical place for a future water supply to supplement the Ware and Swift would be the Connecticut River watershed. (Smith, J. S. E. 10; Fuller, J. S. E. 20; Winsor, J. S. E. 7.)

The extension of the tunnel from the Ware River to the Swift, about ten and one-half miles long, and substantially the same size as the tunnel now being constructed, will give a total tunnel capacity when built of 1,900 million gallons per day for Ware River water which can be diverted either east or west. While it appears that the actual size of the dam and reservoir to be constructed upon the Swift River has not been determined, it does appear that up to date, there has been purchased by the Commonwealth something over 35,000 acres of land, which is approximately 60% of what is contemplated to be acquired for reservoir purposes.

While in order to develop the waters of the Ware and Swift Rivers it would only require a storage capacity of about 140,000,000,000 gallons (Whitman, J. S. E. 12; Gregory, J. S. E. 13), there have been no plans considered by the Commonwealth which have provided for a storage capacity of less than 215,000,000,000 gallons, and the plans run from that figure up to a storage capacity of 420,000,000,000 gallons.

Work so far accomplished

1. *Ware-Wachusett Tunnel.* Dr. Winsor, the Chief Engineer of the Water Supply Commission, testified that the tunnel between the Wachusett Reservoir and Coldbrook on the Ware River is now under construction. The size is the same as recommended in House Document 1550 of 1922, Exhibit "C-1." It is being built entirely through rock and is to be lined throughout with concrete. (Joint Summary of Evidence, p. 5.) It is large enough to take care of additional water if in the future the freshet flows of further tributaries of the Connecticut River are diverted, and the possibility of taking such water in the future was one of the elements considered in the size of the tunnel, although the tunnel was designed primarily for

the purposes of the Ware-Swift project alone. (Joint Summary of Evidence, pp. 7 and 8.)

2. *The Ware River Dam.* A contract has been let for the construction of the dam and substructure for the Ware River intake works and work is in progress. Exhibit "D-29," p. 3 shows $125,155.21 as the estimated value of the work completed out of $273,077.00 estimated as the total cost of the contract.

3. *The Ware-Swift Tunnel.* No contracts have been let which are particularly applicable to this part of the plan. The Massachusetts legislation contemplates extending the tunnel from the Ware River to the Swift River, some 10½ miles (Winsor, Joint Summary of Evidence, p. 5).

4. *Temporary Swift River Diversion Dam.* It has not yet been decided whether this temporary diversion will be undertaken. (Winsor, Joint Summary of Evidence, p. 7.) The Massachusetts legislation authorized it. (Winsor, Joint Summary of Evidence, p. 6.) No contracts have been let which are particularly applicable to this part of the plan. (Ex. "D-29," p. 2.)

5. *Swift River Dam.* Contracts have been let for borings and aerial photographs for the Swift River supply. (Ex. "D-29," p. 2.) The estimated value of work done to date under these contracts is $34,598.26 and the estimated cost of the contracts when completed is $43,833.33.

6. *Purchase of Land.* For reservoir purposes on the Swift River something over 35,000 acres of land have already been acquired which is about 60% of what is contemplated for acquisition. The total amount of land which may be acquired will be practically 90 square miles. The area which will be

actually flooded according to the proposed flow line shown on Ex. "D-1" will be about 39 square miles with a dam at elevation 530 ft. (Joint Summary of Evidence, p. 9.)

The following amounts have been expended for real estate:

(Ex. "D-29," p. 1)	Swift Supply	$3,655,989.31
	Ware "	575,513.18
		$4,231,502.49

The estimated total cost of real estate, rights of way, business damages, water rights, diversion damages, etc., for the complete Ware-Swift project is $12,015,860 (Ex. D-6). The land already taken or to be taken for reservoir purposes in the Swift River valley is in the towns of Enfield, Dana, Greenwich, Prescott, Belchertown, Hardwick, Pelham, Petersham, New Salem, Shutesbury and Ware. (Reprint of Answer, p. 57.) The Metropolitan Water Supply Commission is proceeding under the Swift River Act. (Record, p. 21.)

> "Mr. Warren. Yes, and it is under those acts and only under those acts that this Commission is proceeding."

The land described for taking under the Massachusetts legislation is the same as is recommended in Ex. "C-1" (House Document 1550, Massachusetts, 1922, p. 198).

7. *Power Plant.* No contracts have been let which are particularly applicable to the power plant which is planned to be built at the Wachusett end of the Ware-Wachusett Tunnel, nor for the increased capacity in the existing power plants at the Wachusett Dam and the Sudbury No. 5 dam. (Winsor, Record, p. 200.)

> "Q. Could you tell us how much of a power plant you have in mind on this tunnel? A. I couldn't off

hand. The plans have not gone very far on the power plant itself, but we have some preliminary ideas of it."

8. *General.* Mr. Jacobs, an expert for the Complainant, testified that the tunnel already constructed to the Ware, the further one proposed to the Swift and the reservoir as outlined on Exhibit "D-1" all correspond with the recommendation contained in the Report of 1922 (Ex. "C-1") with no departure therefrom. (Joint Summary of Evidence, p. 12.)

Major Whitman, an expert witness for Complainant, testified that the works already constructed and planned are far beyond what is necessary for the development of the Ware and Swift Rivers in accordance with the legislation of 1926 (Chapter 375) and 1927 (Chapter 321) excepting where that legislation states that the works may be made big enough to take in other streams in the future. (Joint Summary of Evidence, p. 11.)

He further testified that he had made computations to show the amount of storage which would be required to develop all of the water of the Ware and Swift Rivers without permitting any water to continue to flow down the stream. He found that a reservoir of 140 billion gallons capacity would practically completely develop the watershed and the yield would be 270 million gallons per day. (Joint Summary of Evidence, p. 12.)

Dr. Gregory, an expert witness for Complainant, corroborated the statement that a total storage of 140 billion gallons in the Swift Reservoir would be all that is necessary to develop adequately the total water supply yield on the Ware and Swift Rivers, above the points of proposed diversions. (Joint Summary of Evidence, p. 12 and 13.)

Mr. J. Waldo Smith, Consulting Engineer for the present Water Supply Commission having charge of these works, who was the Consulting Engineer for the Joint Board of 1922 (Ex. "C-1") in the preparation of that report, testified that the reservoir and tunnels recommended by the Joint Board were to be built very ample in size and, if required at some later day, they would also take care of additions to that supply and the structures were designed to take care of more water than was immediately necessary. (Joint Summary of Evidence, p. 10.)

The total amount of money spent to March 1, 1930 on the Ware-Swift project is shown in Ex. "D-29," p. 1:

Swift Supply	$4,316,764.23
Ware "	7,287,893.14
Total spent to March 1, 1930	$11,604,657.37

These expenditures have been made since this action has been pending and with full knowledge of its pendency. The contracts for the tunnel, amounting to about $9,000,000, were not let until the Spring of 1928 after the War Department had passed upon the Ware River application. (Winsor, Joint Summary of Evidence, p. 21.) Payments on the tunnel contracts amount to about $5,000,000 out of the $11,604,657.37 expended to March 1, 1930.

Metropolitan District demand for water

The legislation directs that upon the completion of the works authorized for the taking of the waters of the Ware and Swift Rivers, they shall be turned over to the Metropolitan District as a part of its water supply. (Reprint of Answer, p. 38, 54.) The Metropolitan Water District includes the city of Boston and any other city or town the whole or any part of which lies within a radius of ten miles of the State

House in Boston. There are now twenty cities and towns which are members of the District. In addition there are fifteen other towns eligible to become members of the District (Report of Special Master, p. 2), but which have not done so, and supply themselves with water from independent sources. The towns in this Metropolitan District have a present and will have a future water consumption (expressed in million gallons per day) as shown in the agreed statement on Page 159 of the Joint Summary of Evidence as follows:—

	1929	1970	2000
18 towns in Metropolitan District supplied with water	139	...	...
2 towns in District not supplied with water by the District ...	8	...	...
	147	265	...
15 towns eligible but not now in District	24	50	...
	171	315	...

To supply these present and anticipated future requirements, it was agreed by the Massachusetts witnesses that in these same towns the following amounts of water (expressed in million gallons per day) are now and will be available:

	1929	1970	2000
18 towns in Metropolitan District	147	134	129
2 towns not supplied by the District	8	0	...
	155	134	129
15 towns eligible	27	18	...
	182	152	129

In addition thereto it is conceded that there is now *available but not developed* 70 million gallons per day in the

Ipswich River and 15 million gallons per day in the Assabet River, making a total of 85 million gallons per day additional to the supplies now developed and increasing the available supplies for the District as follows (J. S. E. 160, agreement) (Report of Special Master, p. 31):

	1929	1970	2000
Now in use	182	152	129
Ipswich (undeveloped)	70	70	70
Assabet (undeveloped)	15	15	0
	267	237	199

While the Ipswich and Assabet supplies are listed as *available but not developed*, there is no intention upon the part of Massachusetts to develop them but instead of so doing it is its intention to take the Ware and Swift Rivers from the Connecticut River watershed.

Demand for Northeastern Massachusetts

As the case progressed it appeared that while the legislation ostensibly provided a new source of water supply for the Metropolitan District, in reality this project was viewed as furnishing a water supply for all of northeastern Massachusetts not only until 1970 but until the year 2000. Chapter 375, Acts of 1926 Mass., states in Sec. 1 (Reprint of Answer, p. 37):

> "The Commission, on behalf of the Commonwealth, shall forthwith, for the purpose of extending and increasing the water supply of the Metropolitan Water System and *of such cities and towns not members of the Metropolitan water district as may hereafter require water from said system* . . . ." (Italics ours.)

The requirements and supplies of the present and future are set forth in full in the agreement (p. 159 and 160, Joint Summary of Evidence) as follows:

"It is agreed that the following table properly represents the total water consumption requirements in million gallons per day of northeastern Massachusetts in 1929, 1970 and 2000:

	1929	1970	2000
18 towns in Metropolitan District supplied with water	139	...	...
2 towns in District not supplied with water by the District	8	...	...
Total	147	265	...
15 towns eligible but not now in District	24	50	...
10 towns just outside District	4	8	...
20 towns further west	22	50	...
Total	197	373	511
18 towns in Ipswich group	22	47	70
37 other towns in potential group	25	47	72
Total	244	467	653

"It is also agreed that the following table represents accurately the amount of water in million gallons per day which Massachusetts witnesses stated is available and will be available in the years 1929, 1970 and 2000, in northeastern Massachusetts, excluding from consideration the Ware and Swift supplies:

	1929	1970	2000
18 towns in Metropolitan District	147	134	129
2 towns not supplied by the District	8	0	...
Total	155	134	...
15 towns eligible	27	18	
10 towns just outside	4	0	35
20 towns further west	22	20	
Total	208	172	164

18 towns Ipswich group	13	6	0
37 towns potential group	37	26	22
Total	258	204	186
Ipswich River (Hazen recommendation, not developed but available, as a supply)	70	70	70
Assabet River (not developed but available as an emergency supply only)	15	15	0
Total	343	289	256

"It is also agreed that the following table represents the amount of water in million gallons per day which witnesses for Connecticut state is now available for northeastern Massachusetts in addition to the supplies now developed by Massachusetts:

1. Fifteen Watershed Plan:			
A. Shawsheen-Ipswich development:			
1. For Metropolitan District	78		
2. Reserved for local sources	22		
			100
B. South Sudbury Filters (in addition to present supply)			17
C. Lower Sudbury—Hobbs Brook ...			27
D. Assabet			35
			179
2. Merrimac River			200
Total			379

The water available in the Merrimac is not limited to 200 million gallons per day but this figure was selected in order to

work out costs on a project comparable in yield to the Ware-Swift (Jacobs, J. S. E. 163). The supply from the Merrimac is unlimited (Jacobs, J. S. E. 168).

Intention to abandon present sources of supply

It will be noticed in the agreed statement concerning Massachusetts' claims of future available resources that the supply appears to decrease as the years go on. It appears that by 1970 some 54 million gallons per day will be abandoned (being the difference between 343 million gallons a day and 289 million gallons a day (Report of Special Master, p. 3) and by the year 2000 some 87 million gallons per day will have been abandoned (being the difference between 343 million gallons a day and 256 million gallons a day).

Dr. Winsor testified that he took into consideration the abandonment of the Cochituate supply first and the Ashland (part of South Sudbury) supply later. Also that his estimate of the future demand from northeastern Massachusetts practically included the abandonment of the supplies of the towns now supplying themselves, which are within the ten mile radius of the State House at Boston. "While he hadn't thought of it in just those terms, that is what it would amount to." (Joint Summary of Evidence, p. 14.)

Sources available in eastern Massachusetts will not be used

This agreed statement (Joint Summary of Evidence, pp. 159 and 160) shows that Massachusetts limits the sources which it considers available in the eastern part of the state to those now in use plus 85 million gallons per day which is *available but not developed* in the Ipswich and Assabet Rivers (Report of Special Master, p. 31). None of the other supplies listed or suggested by the Complainant's witnesses is considered as available for use although there appears to be more

than 379 million gallons per day available *if developed*. This amount is about twice the yield expected from the Ware and Swift development and will provide sufficient water to satisfy the demand far beyond the year 1970.

These supplies suggested by the Complainant include the supplies mentioned by Dr. Winsor (Joint Summary of Evidence, pp. 19 and 20), as described in the Hazen report (Ex. "C-2") as

> "There are, however, some available additions of substantial amounts which can be made to the present Metropolitan Water Supply from comparatively nearby sources which will render it possible to defer encroachment upon territory in the western portions of the State for a considerable period.
>
> Q. Now, Mr. Winsor, you heard that excerpt from page 40 read? A. I did.
>
> Q. Have any of those available additions of substantial amounts been developed since this report was made, in Eastern Massachusetts? A. No, not to my knowledge."

Even with Ware and Swift development, the available supply will be insufficient before 1970

Dr. Winsor testified (Joint Summary of Evidence, p. 13), that the Ware River Supply would last until the year 1934 providing it could be taken in 1931; that the supply from the temporary dam on the Swift River would suffice until perhaps 1941 or 1942 and that with the complete Ware-Swift development the capacity of all sources would be reached approximately by 1970.

Consequently it is now conceded that within 40 years northeastern Massachusetts will be faced with the same situation as it is to-day—the necessity of a further water supply.

This situation, of course, presupposes present conditions which the Special Master found may be expected to continue (Report of Special Master, p. 31). Supplies will be abandoned whenever it is deemed desirable. The waters of the state will continue to be increasingly polluted. Dr. Goodnough testified that the Merrimac and Connecticut Rivers were expressly exempted from the jurisdiction of the State Board of Health by legislation. (Joint Summary of Evidence, p. 218.) He also testified to the failure of the Commonwealth to clean up streams over which the Board of Health had jurisdiction. (Joint Summary of Evidence, pp. 220 and 221.)

Dr. Winsor testified that it would become necessary within ten or fifteen years before 1970 to plan and provide for an increased supply so as to be available by 1970. (Joint Summary of Evidence, pp. 14 and 16.) Consequently by 1955 or 1960 or within the next 25 years some source of supply must be provided for eastern Massachusetts.

Future Supplies to come from the Connecticut Watershed.

Both Major Whitman (Joint Summary of Evidence, p. 11) and Dr. Gregory (Joint Summary of Evidence, p. 13), testified that if the construction on the Ware and Swift Rivers as authorized in this legislation were carried out, then the logical place from which to provide the future water supplies of eastern Massachusetts would be other tributaries of the Connecticut River in view of the size of the tunnels and reservoir proposed to be constructed and that otherwise the construction would not be practical.

This is in keeping with the legislative reports on water supplies (Exhibit "C-1," and "C-3") which have been discussed in more detail elsewhere. One quotation from Exhibit "C-1" is worthy of repetition however, page 197:

> "The proposed reservoir in the Swift River valley, with a drainage area of 186 square miles and a storage capacity of 410,000,000,000 gallons, would be open

> to the criticism that it was disproportionately large to the size of its drainage area were it not for the fact that the plan contemplates the storage in this reservoir not only of the water of the Swift River, *but also that from large areas in the watersheds of the Ware and Millers Rivers in the earlier years, together with a possible subsequent extension to the Deerfield River and the addition of other areas as future circumstances may require.*" (Italics ours.)

The testimony of Dr. Winsor, Chief Engineer of the Metropolitan District Water Supply Commission is not so frank. (Joint Summary of Evidence, pp. 15-20.) At least it is evident from his testimony that no supply now existing in eastern Massachusetts is to be used and the sources which he mentions as an alternative to other tributaries of the Connecticut River watershed are more speculative than real.

In contrast to this statement we have that of J. Waldo Smith, the consulting engineer of the same Commission and the consulting engineer of the 1922 Joint Board (Exhibit "C-1"). He says (Joint Summary of Evidence, p. 11), "that the taking of water from other tributaries of the Connecticut River was not contemplated but was taken into consideration in 1922; that the other waters that *can be* put into the Swift River reservoir would be the Millers, Deerfield, Quaboag and Westfield and *that those are the ones that must be the next step in the development of the Ware and Swift.*"

The legislation (Acts of 1927, Chapter 321, Mass.) specifically provides (Page 54, Reprint of Answer):

> "The works authorized by this act .... may be so constructed .... as to allow for a future increase in capacity *to take care of the diversion of other streams* in substantial accordance with the plans and recommendations of the joint board on water supply

needs and resources of the commonwealth as contained in its report to the general court in 1922 printed as Ho. Doc. 1550 of that year." (Italics ours.)

Legislation as to other diversions, size of works and expressed intention to use the Connecticut watershed for the future is material.

We have already discussed in detail the legislation of Massachusetts as it specifically authorizes further diversions from streams in the Connecticut River watershed; the size and character of the works and structures recommended by the various reports of legislative committees and expert engineer advisers; the size and character of the works actually under construction by Massachusetts as well as those immediately contemplated; the announced intention in the reports to use the Connecticut River tributaries as a future water supply; and the opinions of both Connecticut and Massachusetts experts that, logically, the future supply will come from these sources.

As to these facts the Special Master states:

"I have disregarded entirely, because it seems to me immaterial, a large amount of testimony on another line. It was contended by Connecticut that the Ware and Swift scheme was simply an entering wedge to the drafting of added waters in the future from the Connecticut valley; and proof was offered of previous proposals in Massachusetts reports and documents to take water from the Millers River and other Connecticut tributaries. It was sought to prove that the tunnel from Wachusett to the Ware and beyond to the Swift was larger than necessary to carry the 191,000,000 gallons a day and that this must be for the purpose of taking added water in the future. I disregard such evidence altogether as it seems to me immaterial. The Massachusetts legislation confines itself to taking certain waters from the Ware and Swift. The Secretary of War has imposed additional limitations. Massachusetts says she intends to divert

> no more water than the Secretary of War permits and in every way to follow the conditions he imposes. It is true that counsel in this case cannot control the future action of Massachusetts. But it is sufficient for this case that injunction should not issue against something merely feared at some indefinite time in the future. Injunction issues to stop present injuries or those presently threatened. The judgment in this case if it goes in favor of Massachusetts, should settle her right to take only so much water and in such manner and at such times as the Secretary of War permits. It will in no way bar or diminish the right of Connecticut to proceed against the taking of additional future water. For this reason I disagree with the suggestion advanced by Connecticut on the hearing, that she is entitled at least to an injunction restraining Massachusetts from taking any more water than the Secretary of War has authorized. As there is no threat on the part of Massachusetts to do that, such an injunction does not seem to me proper." (Report of Special Master, p. 52, 53.)

This conclusion of the Special Master is attacked in Complainant's exceptions 5 and 19.

It was apparently the thought of the Master in deciding these questions that the comprehensiveness of the present works or structures so as to provide for the future addition of water from other streams from the Connecticut watershed was introduced solely for the purpose of anticipating future injury and to secure an injunction restraining anticipated acts of the Commonwealth of Massachusetts and that, in that sense, he found that the evidence was immaterial, because the actual injury was so remote as not to be the subject of present injunctive relief. This was not the purpose for which the evidence was introduced.

When we consider that it is the avowed intention of Massachusetts to procure a water supply which will be permanent

and adequate for an interminable future for the whole of Northeastern Massachusetts, it becomes of importance to know whether the supply for that section of the State now being sought from the Connecticut River watershed is to be a temporary or partial supply for this territory, or whether it is intended that the taking of the waters of the Ware and Swift Rivers is but the first step in the taking of the waters of other tributaries of the Connecticut River. It becomes of especial importance when it is shown that the additional takings of water are to come within a comparatively short period of time in the future.

We learn upon the best authority available, which is Dr. Winsor, the Chief Engineer of the Metropolitan District Water Supply Commission, that by 1955 or 1960, preparations must begin for the securing of additional waters beyond those of the Ware and Swift so that at least by 1970, a new supply must be provided. While it was seemingly impossible to obtain from Dr. Winsor any definite idea as to where these additional waters were to come from, it was very evident that he did not consider using any of the supplies of eastern Massachusetts, and all of the other witnesses both for Connecticut and Massachusetts conceded that with this construction now being carried on the logical source of supply in 1970 would be from other tributaries of the Connecticut River.

This phase of the case is also important if any consideration is to be given to the claim of Massachusetts that this Court is to advise the States of Connecticut and Massachusetts as to what proportion of the waters of the Connecticut River watershed are to be used by each state. It would hardly be fair to the Commonwealth of Massachusetts to permit it to continue the construction of these over-sized and elaborate works unless it could be reasonably assured that they can be used for the purposes for which they were designed and constructed.

If this case is to be taken out of the class of cases ordinarily cognizable by courts of law and equity and be placed in the class of those controversies or disputes which are to be settled by arbitration, and is to settle a basic policy as to the use of the waters of one great watershed by people residing in another and entirely different watershed, the real size of the project and the real intention and purpose underlying the present development should be considered.

Present proposed taking on Ware and Swift Rivers

Under the legislation of the Commonwealth of Massachusetts, it would have been possible to have diverted from the Connecticut River watershed approximately 205,000,000 gallons per day. This amount was to be taken, first from the Ware River where all of the flows in excess of 85,000,000 gallons per day were to be abstracted, and secondly, from the Swift River where all of the flows would be abstracted with the condition that at a point known as Bondsville, a flow of 20,000,000 gallons a day was to be maintained.

Flood Flows not only Water Taken

The legislation pertaining to the diversion of the waters of the Ware River (Acts of 1926, chapter 375, Mass.), (Reprint of Answer, page 37), confines these diversions to that of flood waters.

> "The commission .... shall .... divert into the Wachusett reservoir of said district the *flood waters,* as defined in section four, of the Ware River ...." (Italics ours.)
>
> Section 4. "For the purposes of this Act, the flood waters of the said Ware river which the commission is authorized to divert as provided in section one are hereby defined to be the waters thereof at and

> above the point of diversion established under section one in excess of a flow of eighty-five million gallons a day, meaning thereby, that on any day when the natural flow of said river is less than eighty-five million gallons no water shall be diverted."

Wherever the diversions from the Ware River are spoken of by Massachusetts representatives, said diversions are always referred to as, "the flood waters of the Ware River" (Reprint of Answer, pages 15, 23, 24 and 28). In discussing the Ware River diversions, the War Department referred to these as "excess waters" although in the communication from the Secretary of War, General Jadwin spoke of the "diversion of the flood waters exceeding 85,000,000 gallons per day." (Reprint of Answer, Appendix B, page 87.)

The ordinary definition of flood waters is:

> "An unusually abundant flow of water in a stream rising and overflowing land not commonly covered with water; an inundation, freshet or deluge; flood stage, the lowest stage of a river at which overflow will begin."

A flow of 85 million gallons per day from a drainage area of 100 square miles would not be considered flood waters except by special definition. (Joint Summary of Evidence, page 30.)

In the first place, there was no record of any floods in the Ware River overflowing the banks of that particular stream. Further, the lowest high flow of any year of record on the Ware River was 547 cubic feet per second in 1918 as compared to 85 million gallons per day, or 131 cubic feet per second as defined in the legislation. (Joint Summary of Evidence, page 29.)

Bouvier's Law Dictionary defines a flood as follows:

> "An inundation of water over land not usually covered by it. Such an accident is an Act of God. 4 Harr. Del. 449." (Baldwin's Cent. Ed., 425.)

This definition of floods has been followed generally by the courts as distinguished from the usual or ordinary flows which are confined to the banks of a stream.

> City of Tulsa *v.* Grier, 243 P. 753, 757; 114 Okl., 93.
> Thomson *v.* La Fetra, 183 P. 152; 180 Cal., 771.
> Herminghaus *v.* Southern California Edison Co., 252 P. 607, 610; 200 Cal., 81.
> City of Richmond *v.* Cheatwood, 107 S. E., 830, 833; 130 Va., 76.
> Soules *v.* Northern Pac. R. Company, 157 N. W., 823, 830, 34 N. D., 7, L. R. A., 1917A, 501.

The Special Master assumed, as indicated by the Ware River Act (1926 Ch. 375 Mass.), that the waters of this stream to be taken were flood waters. In Exceptions 1 and 20 the Complainant has objected to this fact. Actually the Act authorizes a diversion of all water over the amount needed for water power purposes in Massachusetts. (Winsor, Joint Summary of Evidence, p. 5.)

War Department suggestions as to Ware and Swift Rivers

Subsequent to applications to the Secretary of War for permission to make these diversions, The Metropolitan District Water Supply Commission was advised by the War Department, first in regard to the Ware River:

> "That no objection will be interposed by the War Department to the diversion of the flood waters of the Ware River exceeding 85,000,000 gallons per day for the period from *October 16 to June 15* each year." (Reprint of Answer, p. 88.) (Italics ours.)

This indicated a restriction virtually that no water may be diverted from the Ware River from June 16th to October 15th of each year, thus reducing somewhat the quantity of water which could be diverted under the legislation with permission of the State Department of Public Health.

In referring to the Swift River diversion, The Metropolitan District Water Supply Commission was advised by the War Department:

> "(b) The War Department is unwilling to admit that the appropriation of water from the Swift River to the extent proposed in this application might not, on occasion, have an appreciable effect on the navigable capacity of the Connecticut River." (Reprint of Answer, p. 101.)

After this finding, the communication from the War Department concludes that

> "limited amounts of water may be appropriated .... without substantially diminishing the navigability .... within the limits of present navigability." (Reprint of Answer, p. 101.)

and on the basis of this finding, placed a restriction during the period from June 1st to November 30th inclusive, that a flow of 70 cubic feet per second should be maintained on the Swift River when the discharge of the Connecticut River is less than 4,900 cubic feet per second (2.1 feet on the Hartford gauge), and more than 4,650 cubic feet per second, and further that a flow of 110 cubic feet per second shall be maintained when the flow of the Connecticut River at Sunderland is 4,650 cubic feet per second (2 ft. on the Hartford gauge) or less. This restriction further limited the quantity of water which might be diverted and also required letting down certain quantities of water from storage.

The net effect of these restrictions was to reduce the quantity of water which Massachusetts could divert under its legislation as restricted by the War Department from 205,000,000 gallons per day to 191,000,000 gallons per day (Report of Special Master, p. 5), or a reduction of 14,000,000 gallons a day. From this will be seen the importance of such an amount of water as 14,000,000 gallons a day when it changes the conditions sufficiently to warrant the Secretary of War from being unwilling to admit that 205,000,000 gallons a day might not have an *appreciable effect on navigable capacity* to the finding that *no substantial alteration* or modification of the navigble capacity of the channel would be effected if 191,000,000 gallons a day were taken under the regulations imposed.

Taking from two streams is determinable

The mean annual discharge of the Connecticut River at the Massachusetts-Connecticut state line is 17,000 cubic feet per second (Report of Special Master, p. 4). The average net diversion from both the Ware and Swift Rivers under the War Department's restrictions is 2 per cent of the mean annual discharge of the Connecticut River. (Joint Summary of Evidence, page 3.) (Report of Special Master, p. 5.)

It is claimed in Exception 2 that the Special Master should have found that these diversions were determinable. This seemed especially important in view of the affirmative allegation of the defendant that the diversions were not measurable nor determinable. (Reprint of Answer, p. 18.)

Suggestions of the War Department have never been reported to, nor accepted by the legislature of Massachusetts

Chapter 375 of the Acts of 1926 and Chapter 321 of the Acts of 1927 under which Massachusetts is proceeding with the constructions necessary to accomplish the contemplated diversion provide for the diversion of certain waters of the Ware

River, said waters being defined as those waters in excess of a flow of 85,000,000 gallons per day, and for the diversion of the flow of the Swift River except on such days as the flow of the Swift River at Bondsville is less than 20,000,000 gallons. These definite provisions as contained in the Massachusetts legislation were the subject of certain suggestions by the War Department. The Department stated that no objection would be interposed to the use of the waters of the Ware River in excess of 85,000,000 gallons per day, for the period October 16 to June 15 each year, and as regards the Swift River, indicated its unwillingness to admit that the appropriation of the water provided for in the legislation might not have an appreciable effect on the navigable capacity of the Connecticut River.

The suggestions of the Secretary of War were duly received by the State of Massachusetts and set up as an appendix in their reprint of answer (p. 84, 92). However, they have not been made the subject of any report to the Great and General Court of Massachusetts and it has taken no action to modify the original legislation. Dr. Winsor, Chief Engineer of the Metropolitan District Water Supply Commission, testified (J. S. E., p. 9) that he is not able to say whether any change in the legislation is contemplated, and that so far as he is concerned he knows of no report to the legislature embodying the suggestions made by the Secretary of War nor of any to be made.

Decree in this case should limit the diversion at least to the restrictions suggested by the Secretary of War

This material refers to Exceptions 7, 8, 18, and 23

The Special Master on page 53 takes up this subject in the following manner:

> "The Massachusetts legislation confines itself to taking certain waters from the Ware and Swift. The Secretary of War has imposed additional limitations,

> Massachusetts says she intends to divert no more water than the Secretary of War permits and in every way to follow the conditions he imposes. It is true that counsel in this case cannot control the future action of Massachusetts. But it is sufficient for this case to say that injunction should not issue against something merely feared at some indefinite time in the future. Injunction issues to stop present injuries or those presently threatened. *The Judgment in this case, if it goes in favor of Massachusetts, should settle her right to take only so much water and in such manner and at such times as the Secretary of War permits.* It will in no way bar or diminish the right of Connecticut to proceed against the taking of additional future water. *For this reason I disagree with the suggestion advanced by Connecticut on the hearing, that she is entitled at least to an injunction restraining Massachusetts from taking any more water than the Secretary of War has authorized.* As there is no threat on the part of Massachusetts to do that such an injunction does not seem to me proper." (Italics ours.)

The Special Master proceeded throughout his report to find many material facts on the assumption that Massachusetts would restrict herself to the suggestions and limitations placed upon the project as outlined in the Massachusetts legislation. This assumption is wholly unjustified.

No indication appears in the entire record in this case that the State of Massachusetts intends to restrict itself to the suggestions laid down by the War Department, and indeed, it has been the claim of the Commonwealth that the War Department had no jurisdiction over the diversion, and it was only during the trial of the case that counsel for Massachusetts, in answer to a question by the Special Master, stated that so far as counsel could bind the State of Massachusetts, it was the intention of the Commonwealth to take only such water as the Secretary of War permitted.

Massachusetts has neither accepted these recommendations in any official manner whatsoever, nor have they been acted upon by the Metropolitan District Water Supply Commission.

The testimony as to damage was largely confined by the Complainant State to the damage that would ensue upon the putting into effect of Massachusetts legislation, or upon the putting into effect of that legislation as limited by the War Department. The Secretary of War has of necessity no interest whatsoever in the flow of the Connecticut River except insofar as the navigable capacity of that stream is affected.

There is no guarantee to the State of Connecticut that the amount of water that the War Department considers necessary to maintain navigation on the river to-day may not be considered excessive by that same Department to-morrow. The War Department may then remove the restrictions placed on the project. Such a removal of restrictions would inevitably result in increased damage to the Complainant State in respect to agriculture, power capacity of the stream, polluted condition of the stream and in all of the other features complained of.

In the event that this Court should see fit to enter a decree in favor of Massachusetts, the only safeguard which the State of Connecticut and its citizens would have against the imposition of such an increased damage would be an injunction from this Court in connection with that decree restraining the State of Massachusetts forever from increasing its diversion to an amount in excess of what the Secretary of War has already indicated would, in his opinion, cause no damage to navigation on the stream. To allow, as the Master suggests, the abstraction of water only in such quantities and at such times as the Secretary of War permits would be not only uncertain but would be unfair to the Complainant State inas-

much as such a decree would give no consideration whatsoever to the various other valuable property rights within the State of Connecticut which are being damaged.

Diversions will reduce flow of Connecticut River at all stages either with or without War Department suggestions

It is significant that from the standpoint of navigation alone, the question of *time when* the diversion takes place may be even more important than the *quantity* of water which is taken. Congress has fixed a project depth for the Connecticut River of 12 feet, equivalent to 2 feet on the Hartford gauge. (Joint Summary of Evidence, page 29.) (Report of Special Master is in error at page 5 and 13 with respect to this.) It will be seen from Paragraph (d) of the communication from the War Department (Reprint of Answer, page 102), that this 2 feet seems to have been the controlling depth for the release of waters from the Swift Rivers; release starting when the gauge is 2.1 feet at Hartford and the quantity of water to be released increasing when the gauge reaches the project depth of 2 feet. Because of the time element involved in the travel of water from the Swift River to Hartford, the gauge at Sunderland, Mass., which is approximately the same distance from Hartford as the point of diversion on the Swift River, was used as the guide in determining the time when water should be released. It was found that when the flow at Sunderland was 4,650 cubic feet per second, that the average lower lowtide gauge height at Hartford was 2.0 feet. (Reprint of Answer, page 102.) The record shows that when the gauge at Hartford is 2 feet, the average flow of the Connecticut River at that point is 5,200 cubic feet per second, Exhibit "C-25-A." (Joint Summary of Evidence, page 35.) The difference between the flow at these points must come from the natural flow from the drainage area lying between Hartford, Conn. and Sunderland, Mass. which area includes the valleys of the Ware and Swift Rivers. If it were a fact

that the flow of water into a stream is the same for each square mile of drainage area, then average conditions would be of importance, but actual experience shows that when the flow of water from one part of the drainage area is low, that the flow from other parts may be quite high, so that while under average conditions it was intended that the restrictions of the Secretary of War would improve conditions on the River, or at least, maintain them equal to what the conditions were before the diversions, at times when the Hartford gauge was 2 feet or less, yet the intention is not carried out. Had average conditions prevailed, the calculations as shown in Complainant's Exhibits "25-A" and "25-B" would hold; namely, that when the Hartford gauge was 2 feet, the proposed diversions would lower the gauge from .01 to .02-foot under the Massachusetts legislation, and the gauge would be raised from .01 to .02 of a foot under the restrictions of the Secretary of War. But such average conditions do not prevail. This was shown by Complainant's Exhibit "C-41," based on the years 1914 to 1927 which Exhibit was supplemented and corroborated by Defendant's Exhibit "D-36," which included all of the years from 1913 to 1929 inclusive. This showed that the gauge at Hartford is two feet or less for more than two months of the year—about 67 days in Complainant's Exhibit "C-41," and about 72 days in Defendant's Exhibit "D-36." On the other hand the number of days when water would be released in excess of the natural flow of the Swift River under the Army restrictions, would be 37 days according to Complainant's Exhibit "C-41," and 43 days according to Defendant's Exhibit "D-36," leaving in both cases 29 days a year or practically one month when the Hartford gauge will be 2 feet or less, and diversions will be permitted from the Swift River, because the natural flow of the Swift River was in excess of the water released as required under the restrictions of the Secretary of War, and on these days the gauge at Hartford would have been reduced as much as 2½ inches as shown by Complainant's Exhibit "C-41." This shows the

wide variations which take place due to the difference in stream flows on different parts of the watershed of the same stream. While it was contemplated under average conditions, as shown in Complainant's Exhibit "C-25," that the diversions under the Massachusetts legislation would have reduced the Hartford gauge .02 of a foot or less when the stage was 2 feet or less, yet as shown on Page 3 of Complainant's Exhibit "C-41," the reductions were as high as .25 of a foot, or 3 inches, over ten times the average reduction that was expected on the basis of averages, and this shows even in greater contrast when the average increase from .01 to .02 of a foot, which was to be expected under the restrictions of the Secretary of War as shown in Complainant's Exhibit "C-25-B" actually would have resulted in decreases as much as 0.2 of a foot or 2½ inches. During a large portion of the year, the stage of the river is only at 2 feet on the gauge or below, and during practically 40% of the days when the river stage at Hartford is 2 feet or less, diversions will be taking place, lowering the stage of the river as measured by the gauge at Hartford.

While the project authorized by Congress for Navigation from Hartford to Long Island Sound is based on a project depth of 12 feet, which is equivalent to 2 feet on the Hartford gauge, yet the record shows that there has never been sufficient work done under the appropriations of Congress to maintain the river at such a depth at all times and that in spite of the amount of dredging that is being done, navigation requires not a gauge height of 2 feet, but a gauge height of from 3 to 4 feet in order that barges and steamers can freely pass up and down the river. In the judgment of the mariners who testified in this case no water can be spared, not only when the gauge is 2 feet or lower, but also during the time when the gauge is between 2 and 4 feet. According to Complainant's Exhibit "C-25," this is about 37% of the time, or 135 days a year. Either under the Massachusetts legislation or under the

restrictions of the Secretary of War, diversions would take place so as to reduce the gauge height at Hartford on an average of .04 of a foot. This is about twice the average reduction which was expected at 2 feet under the Massachusetts regulations. With increasing gauge height in general, there will be increasing diversions. These are set forth for each foot in Complainant's Exhibit "C-25," showing the effect up to a point of 12 feet on the Hartford gauge at which times the reduction would be on an average approximately 3 inches.

It will be observed that the gauge is 12 feet or less 93% of the time, or 339 days a year, leaving 26 days when the river is above 12 feet. The flood stage in the Connecticut River is considered as 16 feet, the flood stages from 1913 to 1926 inclusive are shown graphically in Complainant's Exhibit "C-6," "C-6A" and "C-6B." These Exhibits show further the reduction which would have taken place in flood heights under the Mass. legislation and also under the modifications of the Secretary of War. During this period of 14 years, there were 178 days or an average of 13 days a year when the river was in flood as indicated by the Hartford gauge. On these days, the reduction in gauge height would have been as much as 6½ inches.

Because of these facts the Complainant excepted to the Special Master's Report as set forth in Exceptions 3 and 4.

The use of flowing water is a real property right

The Special Master erred and mistook the law in refusing to hold that the right to all flowing waters including flood waters is a property right protected under the Constitutions of the United States, the State of Connecticut, and the Commonwealth of Massachusetts. (Exception 22.) While there may be no ownership in flowing waters as such, the rights which

pertain to flowing waters are wholly derived from the ownership of land along the banks of the stream through which the water flows. The ownership of these lands carries with it, as an incident of such ownership, the right to use, in common with all other riparian owners along the stream, these flowing waters for certain purposes. The use to be made of these waters by any one riparian owner must be of such a character as to be consistent with a like use by all other riparian owners.

King *v.* Tiffany, 9 Conn., 162, 168.
Pratt *v.* Lamson, 84 Mass., 275.
Moulton *v.* Newburyport Water Co., 137 Mass., 163.

Such use is a vested property right

The use of flowing waters, existing solely because it is an incident to ownership of real estate along the banks of the stream, constitutes such a right a vested property right. It is known as an usufruct. The right is a right in real estate.

Hollister *v.* Union Co., 9 Conn., 435, 443.
Johnson *v.* Jordan, 43 Mass., 234, 239.
Cary *v.* Daniels, 46 Mass., 236, 238.

Includes flood waters

The right to use the waters of a flowing stream is applicable to all the water which nature supplies in the stream. It is not limited to the amount of water which flows in the stream in any one season of the year or any one year or an average of a number of years. Whether it be during periods of low flow or periods of high flow, commonly known as flood water, or an intermediate flow, a riparian owner is entitled to use of all of them. In Connecticut, flood waters occupy in its judicial decisions a class by themselves; and the Supreme Court of Connecticut has specifically said that a riparian owner is entitled to these flood waters to the same extent to which he is entitled to the use of any other flows of the stream.

Thompson *v.* New Haven Water Co., 86 Conn., 597.

In Massachusetts, while this distinction is not so marked, the courts have held that the flow of the stream to which riparian owners are entitled includes all of the waters flowing by nature, including the flood waters.

Nemasket Mills *v.* Taunton, 166 Mass., 540, 544.

Extent of rights

Unimpaired as to Quantity and uncontaminated as to Quality

The general rule of the common law states that a riparian owner is entitled to the use of flowing waters as they are wont to flow; that these waters must come to him and must be released by him after use unimpaired as to quantity and uncontaminated as to quality.

King *v.* Tiffany, 9 Conn., 162.
Buddington *v.* Bradley, 10 Conn., 212.
Wadsworth *v.* Tillotson, 15 Conn., 365.
Agawam Canal Co. *v.* Edward, 36 Conn., 476.
Waterbury *v.* Platt Bros. Co., 76 Conn., 435.
Colburn *v.* Richards, 13 Mass., 422.
Anthony *v.* Lapham, 22 Mass., 175.
Johnson *v.* Jordan, 43 Mass., 234.
Elliott *v.* Fitchburg R. R. Co., 64 Mass., 191, 196.

Reasonable use

The rights of riparian owners to use the waters of a flowing stream are limited to such use as will permit of a like use by all other riparian owners along the stream. They include, as a right, the use of the water for watering his cattle, and for a domestic supply for his household, and to a limited extent for the irrigation of his land.

Use for municipal water supply a non-riparian use

The use of water for domestic purposes by a municipality, even where the municipality is a riparian owner, and located upon the banks of a flowing stream, has never been recognized in either the State of Connecticut or the Commonwealth of Massachusetts as a reasonable use of such waters. From the earliest times the right of a municipality to use the waters of flowing streams for such purposes has been granted by legislative acts, and provisions made for compensation to be paid by the municipalities to riparian owners along the stream.

Harding *v.* Stamford Water Co., 41 Conn., 91.
Moulton *v.* Newburyport Water Co., 137 Mass., 163.
Proprietors of Mills on Monatequot River *v.* Braintree Water Supply Co., 149 Mass., 478, 486.
Stevens *v.* Worcester, 219 Mass., 128.

Taking waters for non-riparian use must be by eminent domain

If any riparian owner desires to use flowing waters for purposes other than those usually considered a riparian use, he must either acquire those rights to make such further use of the waters by securing deeds or grants from all other riparian owners having an equal right with him to their use, or else he must obtain from the state the power to take the rights of such other riparian owners. In order to acquire this right, the use which he intends to make of the waters must be a public use, for this is the only ground upon which the state can grant the right to take private property; and provision must also be made for the payment of just compensation. It is because the legislative department has recognized the public necessity of developing manufacturing and furnishing a water supply which is adequate to centers of population, that it has authorized, sometimes in specific instances and sometimes by general act, the taking of water for purposes of millwrights, manufacturing plants, and municipal water supply. This has

all been accomplished through legislative act, authorizing the taking upon the payment of just compensation; and we can find no cases which authorize the use of water for these purposes without such legislative authority.

Ætna Mills *v.* Brookline, 127 Mass., 69, 71, 72.
Ætna Mills *v.* Waltham, 126 Mass., 422, 425.
Lynfield *v.* Peabody, 219 Mass., 322.

We cannot quarrel with the general statement that each riparian owner is entitled to a reasonable and just use of the water on its course through his land; and the cases cited are ample to sustain the general proposition; but an examination of all the cases cited fails to disclose any one of them in which the use of water for a domestic supply of a municipality has been sustained. Perhaps the nearest approach to this question is the Case of *Stratton v. Mt. Hermon Boys' School*, 216 Mass., 83, 85, in which the waters of a stream, without legislative act, were diverted for the purpose of supplying a boys' school with water. Of course this school would consume much less water than any ordinary town or city, and its use was probably necessary for the satisfactory maintenance of the institution; but the court found that such use was not a reasonable one and awarded substantial compensation to the plaintiff.

Sovereign must consent to taking

Sovereign rights can only be divested by the voluntary act of the sovereign. This may be accomplished in a number of different ways under our form of government. So far as powers have been delegated to the United States, such rights as are necessary to carry into effect such powers have been transferred to the United States by the States. The ratification of the Constitution effected the transfer. It was the voluntary act of the sovereign power of each State. Such act was that of the legislative branch of the government. It is the legislative branch which today must approve of all amendments to the

Constitution which may seek to delegate further powers to the federal government.

The legislature of a state may also by appropriate action, enter into agreement or compact with another state. But this agreement or compact must be approved by the legislatures of the states involved and by the legislative branch of the United States government. In no case is there any intimation that any department other than the legislative can so act.

In *Hudson Water Company v. McCarter*, 209 U. S., 349, it was said:

> "But is it recognized that the state, as quasi-sovereign and representative of the interests of the public has a standing in court to protect the atmosphere and the water and the forests within its territory, irrespective of the assent or dissent of the private owners of the land most immediately concerned."

And further—

> "It finds itself in possession of what all admit to be a great public good; and what it has it may keep and give no one a reason for its will."

In *Georgia v. Tennessee Copper Co.*, 206 U. S., 230, this is said:

> "This is a suit by a state for injury to it in its capacity of quasi-sovereign. In that capacity the state has an interest independent of and behind the titles of its citizens, in all the earth and air within its domain."

And in *Kansas v. Colorado*, 206 U. S., 46:

> "One cardinal rule underlying all the relations of the states to each other is that of equality of right. Each state stands on the same level with all the rest. It can impose its own legislation on no one of the others, and is bound to yield its own views to none."

The common law rule as to riparian ownership is effective in both Connecticut and Massachusetts

The Complainant contends that where both States have adopted the common rule of riparian rights the Supreme Court of the United States has no function but to apply the rule of the common law in force in both States in the determination of a controversy between the two States.

In the case of *Stratton v. Mt. Hermon Boys' School*, 216 Mass., 83, the Court discussed the question of the use of water outside the watershed, and stated

> "There can be no recovery for a diversion of water for a proper use, so small in quantity and of such a character that it occasions no injury to the present or future use of the lower riparian land . . . . Nor is this inconsistent with the decisions which hold that there may be recovery even though there is no present actual damage, provided an injurious effect may be produced upon the lower estate by the acquirement of right through the lapse of time." (Stimson *v.* Brookline, 197 Mass., 568; Newhall *v.* Ireson, 54 American Decisions, 790; Lond *v.* New Bedford, 121 Mass., 286; Ware *v.* Allen, 140 Mass., 513.)

> "The distinction is between a diversion which causes a present or potential injury to the lower estate for a valuable use, *and one which cannot produce such a result.*" (Italics are ours.)

Colburn *v.* Richards, 13 Mass., 422.
Anthony *v.* Lapham, 22 Mass., 175.
Johnson *v.* Jordan, 43 Mass., 234.
Elliott *v.* Fitchburg R. R. Co., 64 Mass., 191, 196.
King *v.* Tiffany, 9 Conn., 162.
Buddington *v.* Bradley, 10 Conn., 212.
Wadsworth *v.* Tillotson, 15 Conn., 365.
Agawam Canal Co., *v.* Edward, 36 Conn., 476.
Waterbury *v.* Platt Bros. Co., 76 Conn., 435.

"Under the doctrine of the common law as to riparian rights, a riparian owner does not have the right to divert the water of the stream for use on non-riparian land." (2 Farnham on Waters and Water Rights, Section 497.)

"It is not necessary to allege or prove specific damage in either Connecticut or Massachusetts in order to obtain relief against the invasion of a right in or to a flowing water." (*Wellington v. Rawson*, 231 Mass., 189; *Water Commissioners v. Perry*, 69 Conn., 461.)

"The first contention of the defendant is that the bill does not state a case for equitable relief because there is no allegation of damages . . . . . It is not essential to allege that the plaintiff suffered damage by the acts of the defendant. The plaintiff's right was invaded. In such a case no special damage, no actual, pecuniary loss need be stated or proved. The law presumes that a party sustains some damage from the infringement of his right and enables to maintain an action whether he has suffered actual damage or not." (*Atkins v. Boardman, Mass.*, 37, *American Decisions*, 100; *Wellington v. Rawson*, 231 Mass., 189.)

The law of the two states governs an action between them and no new rule of law can be imposed upon them or either of them

On page 7 of the Report of the Special Master, the following statement is made:

"I think equally unsound is the contention that the Supreme Court in a suit between two states which recognize the common law is confined to rules sanctioned by common law."

and in support of his contention the Special Master cites *Kansas v. Colorado*, 206 U. S., 46, and *Wyoming v. Colorado*, 259 U. S., 419.

The Complainant excepted to this finding (Exceptions 10, 11, and 13) because it is claimed that when a rule of law obtains in each of two states that rule should be followed in a justiciable controversy between them.

In the case of *Kansas v. Colorado*, 206 U. S., 46, although the Court covered a great deal of ground in a general discussion of the powers of this Court in cases of this character, the real decision of the case is based upon the statement that—

> "As Kansas thus recognizes the right of appropriating the waters of a stream for purposes of irrigation, subject to the condition of an equitable division between the riparian proprietors, she cannot complain if the same rule is administered between herself and a sister state."

In other words, the Court, having found that Kansas recognized the rule of appropriation of waters, and Colorado enforced a like rule, that this common rule should be adopted by this Court as the rule for determining the issues between the two states.

The case of *Wyoming v. Colorado*, which the Special Master cites was a controversy between two states which concededly were prior appropriation states and the Supreme Court applied the prior appropriation rule with great strictness even to the point of deciding how many acre-feet of water Wyoming had appropriated, and the Court goes on to say at page 496:

> "the amount covered by senior appropriations in Wyoming is 272,500 acre-feet, there remain 15,500 acre-feet which are subject to this junior appropriation in Colorado .... A decree will accordingly be entered enjoining the defendants from diverting or taking more than 15,500 acre-feet per year from the Laramie River...."

The foregoing is an unequivocal application of the prior appropriation rule which obtained in each of the two states.

> "Turning to the decisions of the courts of last resort in the two states, we learn that the same doctrine respecting the diversion and use of the waters of natural streams has prevailed in both from the beginning, and that each state attributes much of her development and prosperity to the practical operation of this doctrine. The relevant views of the origin and nature of the doctrine, as shown in these decisions, may be summarized as follows: The common law rule respecting riparian rights in flowing water never obtained in either state. It always was deemed inapplicable to their situation and climatic conditions." (*Wyoming v. Colorado*, 259 U. S., 458, 459.)

The common law doctrine of riparian rights has been applied by all the courts, including the courts of last resort in both the State of Connecticut and the Commonwealth of Massachusetts.

> Colburn *v.* Richards, 13 Mass., 422.
> Anthony *v.* Lapham, 22 Mass., 175.
> Johnson *v.* Jordan, 43 Mass., 234.
> Elliott *v.* Fitchburg R. R. Co., 64 Mass., 191, 196.
> King *v.* Tiffany, 9 Conn., 162.
> Buddington *v.* Bradley, 10 Conn., 212.
> Wadsworth *v.* Tillotson, 15 Conn., 365.
> Agawam Canal Co. *v.* Edward, 36 Conn., 476.
> Waterbury *v.* Platt Bros. Co., 76 Conn., 435.

In the case of *Kansas v. Colorado*, 206 U. S., 46, 95, this Court stated: "In other words through these successive disputes and decisions this Court is practically building up what may be not improperly called Interstate Common Law."

The definition of common law, as stated by Blackstone in his Commentary, is that it is a rule of conduct which has existed since the memory of man runneth not to the contrary.

This of course, cannot mean that a new principle of law may be injected as common law by either state, or as applicable to controversies between the states, but must necessarily be the result of a long continued practice acquiesced in by substantially all those interested in the subject of the controversy.

If there is one common law rule which has been consistently followed by this court for a length of time sufficient to be denominated interstate common law, it is the rule that where this Court determines the laws of the states involved in the controversy to be substantially the same, this is the law which is followed by this Court in the particular case before it.

In *3 Enc. U. S. Reports*, page 970, it is stated:

> "There is no common law of the United States, in the sense of a national customary law, distinct from the common law of England as adopted by the several states, each for itself, applied as its local law, and subject to such alteration as may be provided by its own statutes; but general common law exists throughout the United States, not, it is true, as a body of law distinct from the common law in force in the states, but as containing the general rules and principles by which all transactions are controlled, except so far as those rules and principles are set aside by express statute. Hence, when a common law right is asserted, the laws of the state in which the controversy originated must be looked to."

In those cases which have come before this Court concerning boundary lines between states, the sole question before the Court has been the determination of the proper boundary line between the two states involved. There has been no difference between the action of this Court in determining the boundary line between two states, and the courts of any one of the states in determining the boundary line between the property of two of its citizens. No attempt has been made to divest either state

of property to which it was entitled and to give it to the other. It has simply been a question of determining the true line.

This was illustrated in the case of *Louisiana v. Mississippi*, 202 U. S., 1, where the Court said:

> "The islands, marsh or otherwise, claimed by Louisiana in this case, were all within three leagues of her coast. The act admitting Mississippi was passed five years after the Louisiana Act, yet Mississippi claims thereunder the disputed territory as being islands within eighteen miles of her shore. If it were true that this repugnancy between the two Acts existed, it is enough to say that Congress, after the admission of Louisiana, could not take away any portion of that state and give it to the state of Mississippi."

The fundamental principle in this case is no different than where one property owner has acquired property by deed and his neighbor thereafter has acquired a portion of the same property from the same grantor. The court, in such a case, would necessarily be bound to apply the rule that the grantor exhausted his powers of alienation when he made the first grant, and that the property of the first grantee could not be taken away and awarded to the second grantee.

In the case of *Wisconsin v. The State of Illinois and the Sanitary District of Chicago*, 278 U. S., 367, all of the Lake States, so-called, and the State of Illinois were common law riparian ownership states. According to the claims of the Lake States, as set forth in substance in the reported opinion of this case, they asserted that as riparian owners, and as representatives of their people that they were entitled to the waters of the Great Lakes as nature provided them; and that the State of Illinois and the Sanitary District of Chicago had no right to divert any of these waters for municipal purposes of the Sanitary District.

They further claimed that no legal authority was conferred by the legislative act of the State of Illinois authorizing the diversion. To protect the Lake States against this diversion an injunction was granted by this Court as prayed for. It is apparent from the digest of claims, as they appear in the reported decision, of both the Lake States and the State of Illinois and the Sanitary District of Chicago, that these states were at issue as to the rights of the respective states to establish and enforce the common law doctrine of riparian ownership within their own borders. To have granted the injunction prayed for in this case, it was necessary for this Court, having found that the federal authority was insufficient as a legal basis for the diversion, to have come to the conclusion that the claims of the Lake States were correct, and that no authority was vested, either in the State of Illinois or in any other place or in this Court, to authorize or permit a diversion of the waters of the Great Lakes as against the objections of the Lake States.

From the above it is evident that this Court will apply in a suit between the two states the law of the states rather than a rule of its own. In overruling the Complainant's claim to this effect the Special Master erred.

Both Massachusetts and Connecticut adhere to common law and this has been conceded for the purpose of this case in the answer to the bill of Complainant (Reprint of Answer, page 5), from which we quote: "And further answering the defendant says, that by the law both of the Commonwealth of Massachusetts and of the State of Connecticut owners of riparian lands are entitled to make reasonable and equitable use of the waters of the streams flowing by or through their land providing that such use is not inconsistent with a similar reasonable and equitable use of the said streams by lower riparian owners."

Massachusetts has not changed this rule

The Special Master held that

> "Massachusetts has a right to change her common law, and by the legislation in question, so far as her power extends, she has legalized the proposed diversion. I think it cannot be maintained that Connecticut has any vested right to insist that Massachusetts must continue common law rules as originally introduced from England." (Report of Special Master, page 10.)

In this finding the Special Master erred and mistook the law in holding that the Commonwealth of Massachusetts had adopted any system of law which will permit the diversion of any water from its streams except by the consent of all riparian owners or by a taking under legislative authority for a public use. (Exceptions 15 and 16.)

The statutes under which the State of Massachusetts is proceeding are the Acts of 1926, Chapter 375, and the Acts of 1927, Chapter 321, and these statutes provide for the establishment of a special Metropolitan District Water Supply Commission for the diversion of waters of the Ware and Swift Rivers into the Wachusett Reservoir by means of a tunnel and for the construction of a reservoir on the Swift River.

Under the provisions of both Acts the Commission so established is empowered to "take by eminent domain or acquire by purchase or otherwise the flood waters, as hereinbefore defined, ... and all water rights, water sources, lands, rights of way, easements and other interests in land, including any cemetery.

> Acts of 1926, Chapter 375, Section 5
> Acts of 1927, Chapter 321, Section 4

The 1926 Act further provides:

> "The owner of any real estate, *whether within or without the Commonwealth*, which is not taken but is injured by the taking of the waters of the Ware River under the authority of this Act or by the construction of the works incidental thereto shall be entitled to damages therefor and may recover the same from the Commonwealth as in the case of a taking in accordance with the provisions of this Act." (Reprint of Answer, p. 42.)

The 1927 Act provided for the filing of a claim by "any person or corporation claiming to be injured."

These statutes, then, recognized the common law principle of riparian ownership by providing for payment for any injury to lower riparians and for a taking where necessary by eminent domain. The statutes made no attempt to effect a change in the common law rules as obtained in the Commonwealth at the time the statutes were passed.

On the other hand, it recognized the validity of rights established under the common law rule and provided for payment for them. A sovereign state may, of course, in the exercise of its legislative authority take from its inhabitants their property with the provision that it must take that property in such a manner as not to deprive its inhabitants of their property rights without due process of law.

In other words, the Commonwealth may deprive the individual inhabitant of his property and property rights but it must make just and fair compensation to the inhabitant so deprived.

The Commonwealth by enacting this legislation took cognizance of the fact that the common law rights of riparians existed within the borders of Massachusetts and in accordance

with the existence of said rights provided for making compensation for their taking. The statutes, then, did not in any way change the status of the law on riparian rights but rather recognized and provided for the enforcement of those rights.

Inasmuch as the use which Massachusetts intends to make of the water is not a riparian use she must make compensation for such property rights of lower riparians as are damaged or lost. There are two methods of acquiring property in such a case; one is by the exercise of the sovereign right of eminent domain and the other is by ordinary purchase.

The State of Connecticut claims that it has shown by clear and convincing evidence that property rights of citizens within the State of Connecticut have been damaged by the contemplated diversion.

The right of Massachusetts to exercise its power of eminent domain does not extend beyond the territorial boundaries of that state and she can not condemn for the benefit of Massachusetts, property of inhabitants of other states when that property is without her borders.

The only way by which Massachusetts can lawfully acquire property and property rights belonging to inhabitants of Connecticut and located in Connecticut, is by the ordinary method of purchase.

There has been no attempt made by Massachusetts to effect a purchase of the rights that she is infringing within the State of Connecticut and the only method of redress offered to the State of Connecticut and its citizens for any damage that will ensue to them from the contemplated diversion is the provision in the Massachusetts statute authorizing the diversion, which allows any person aggrieved by the actions of Massachusetts to come to Massachusetts and present a claim to a Commission

set up by Massachusetts for the amount of damage suffered, and in the event that this claim is disallowed the person so damaged may appeal to the Massachusetts courts. Such a remedy is not an adequate legal remdy.

The rule is phrased in *Stanton v. Ambrey*, 46 Conn., 595, as follows:

> "But no legal remedy can be considered as adequate, which a party is compelled to go into a foreign jurisdiction to avail himself of. It must be a remedy which our own Courts can apply."

No competent legislative authority has authorized the taking of these waters

The Special Master erred in holding that water may be taken from the watershed of an interstate stream and forever removed therefrom so as to deprive the lower states of the use thereof, without the exercise of the legislative authority prescribed by the Constitution, which is the legislatures of the states with the approval of the Congress of the United States. (Exception 14.)

1. *Taking—A legislative function*

The exercise of the power of eminent domain is not a granted power under any constitution. It is an inherent power of sovereignty. The state or the United States, for any public purpose, has the inherent power to take the property of its citizens. The determination of what property shall be taken, and the amount of the property to be taken, is a purely legislative function of government. The only restriction upon this power is that the purpose for which the property is taken shall be a public purpose. So long as the purpose is a public purpose, the courts or the judicial power of the government

have no jurisdiction to review the action of the legislative department in authorizing the taking or the determination of whether or not the taking is necessary.

Rindge Co. *v.* County of Los Angeles, 262 U. S. 700.

2. *Compensation is a judicial function*

As contrasted with the taking, all of the constitutions provide that private property shall not be taken for public purposes without compensation. This constitutional provision confers upon the judiciary the determination of whether or not the compensation provided by the legislative enactment is a just compensation. It also clothes the judiciary with the power of preventing the taking of private property for public use without any provisions for compensation.

Seaboard Air Line Railroad *v.* U. S., 261 U. S. 299.

3. *A legal taking and compensation must exist to be constitutional*

Unless there is a taking of property authorized by some legislative department of government competent to act, and a provision made for just compensation for the property taken, it is impossible to acquire property for public use. Both elements must exist to constitute a proper exercise of the power of eminent domain.

4. *Condemnation limited by state boundaries*

Any state undertaking to exercise the power of eminent domain by legislative act is limited in the extent of its authority to its boundaries. No state has the authority to exercise this power over property or property rights located in another state. The only legislative act which is depended upon as authority for the taking of any riparian rights within

the state of Connecticut are the two acts passed by the Great and General Court of the Commonwealth of Massachusetts, known as Chapter 375 of the Acts of 1926, relating to the Ware River, and Chapter 321 of the Acts of 1927, relating to the Swift River.

The rights of the State of Connecticut and its citizens in the use of the waters of the Ware and Swift Rivers, as they flow into and through the Connecticut River, are property rights existing within the State of Connecticut. When the Commonwealth of Massachusetts undertakes to deprive these owners of their rights in these waters, it is not taking property rights which are located within the Commonwealth of Massachusetts, but property rights which are situated beyond its borders. These acts of the Commonwealth of Massachusetts speak only within the borders of that commonwealth; and insofar as they are depended on for authority to take property located within the State of Connecticut, they are void and furnish no adequate defense to this action.

Waters cannot be taken without the consent of Connecticut

There is no power under the laws in force both in Massachusetts and Connecticut to enable the defendant to remove the waters from an interstate stream without the consent of the complainant state. (Exception 21.) There must be some sovereign power to authorize the taking of this water. The Commonwealth of Massachusetts, having no authority through its Great and General Court to authorize the taking of property located in Connecticut, and no authority residing in the legislative department of the United States to authorize one state to take property situated in another state, there exists no legislative power which can authorize the taking of this property unless it be that the State of Connecticut might authorize the taking of the property of its citizens for a public use in the Commonwealth of Massachusetts.

There is no adequate remedy at law

The Special Master erred and mistook the law in holding that in a controversy between states where it is possible to measure the damages inflicted upon the rights existing in one state the remedy is one at law. (Exception 12.)

Sovereign cannot be forced to accept compensation

The claim is made that by the Acts of the Commonwealth of Massachusetts a provision is made for an award of compensation to be made by the courts of the Commonwealth, when the citizens of another state are willing to have this question considered in the courts of the Commonwealth of Massachusetts. Whatever effect this might have in the case of individual citizens, it certainly can have no effect as far as the State of Connecticut is concerned. One state has no right, by legislative enactment to force another sovereign state to accept damages for any injury to its sovereign rights. Such a doctrine would deny the fundamental principles of sovereignty.

> "It is not lightly to be required to give up quasi sovereign rights for pay; and apart from the difficulty of valuing such rights in money, if that be its choice it may insist that an infraction of them shall be stopped."
>
> Georgia v. Tennessee Copper Co., 206 U. S., 230, 237.

Effect of provision for citizens of one state to come into another and seek damages in the Courts of another state

The defendant sets forth on page 27 of the Reprint of Answer that, under the two acts in question, of the Great and General Court of the Commonwealth of Massachusetts, there is a provision:

> "The owner of any real estate, whether within or without the Commonwealth which is not taken but is injured by the taking of the waters of Ware River under authority of this act, or by the construction of the works incidental thereto, shall be entitled to damages therefor and may recover the same from the Commonwealth as in the case of a taking in accordance with the provisions of this act." (Page 42 Reprint of Answer.)

The case of *Manville Co. v. The City of Worcester*, 138, Mass., page 89, is quoted on page 27 of the defendant's Reprint of Answer as apparent authority for the proposition that so long as this provision is contained in the act of the Commonwealth of Massachusetts, it is sufficient to justify the taking of water rights located outside of that Commonwealth.

The property right in Connecticut is injured by an act committed in Massachusetts. The damage occurs in Connecticut; the act that occasioned the damage was done in Massachusetts. Massachusetts sets up the claim that the injured citizen, resident of a sister state, is given an opportunity to resort to the Massachusetts courts to cover damages. His remedy is limited to that set forth in the statute. He must bring his action in the state courts. The Commonwealth of Massachusetts can not force a non-resident owner to come into its courts to redress his damage in contravention to its constitutional provisions and the jurisdiction of the federal courts.

8 Harvard Law Review, 138.

Money damages is not governing factor

The Special Master erred and mistook the law in overruling the Complainant's claim that any invasion of the right or privileges of a sovereign state calls for an injunction and does not require specific proof of the actual amount of money damages which might be suffered by reason of such invasion. (Exception 9.)

In a case where there is an invasion of right, as distinguished from damages caused by the exercise of a legal right, the courts have uniformly held in Connecticut and Massachusetts that the question of damage was included in the violation of the right; and that therefore it is unnecessary to allege specific damage in order to seek relief against the invasion of right in a court of equity.

> Water Commissioners *v.* Perry, 69 Conn., 461.
> Wellington *v.* Rawson, 231 Mass., 189.

The Special Master in the instant cause disposes of the Complainant's contention that any invasion of the rights or privileges of a sovereign state calls for an injunction regardless of damage as follows (Report of Special Master, p. 7):

> "It ignores that injunction is not granted where there is an adequate remedy at law; and also it seems to me directly in the teeth of the cases of *Missouri v. Illinois*, 200 U. S., 496, at 521; *New York v. New Jersey*, 256 U. S., 296, at 309, and *North Dakota v. Minnesota*, 263 U. S., 365, at 374. In the latter case the court said:
>
> "In such action by one state against another, the burden on the complainant state of sustaining the allegations of its complaint is much greater than that imposed upon a complainant in an ordinary suit between private parties. 'Before this court can be moved to exercise its extraordinary power under the constitution to control the conduct of one state at the suit of another, the threatened invasion of rights must be of serious magnitude and it must be established by clear and convincing evidence.' *New York v. New Jersey*, 256 U. S., 296, 309; *Missouri v. Illinois*, 200 U. S., 496, 521."

In other words, the Special Master evidently feels that the common law rule as to the rights of lower riparians within a particular state becomes of no consequence when the lower riparian is a sovereign state and where the abstracting upper

riparian is also a sovereign state, and the Master relies upon the oft-quoted statement from Missouri *v.* Illinois (Supra).

An examination of the facts in each of the cases wherein this statement regarding the necessity of a "threatened invasion of rights of serious magnitude" appears discloses the following:

In *Missouri v. Illinois* the action was to restrain the discharge of sewage into the Des Plains River, a tributary of the Mississippi and thus render the Mississippi unfit to drink; in *New York v. New Jersey*, the action was to restrain the disposal of the sewage of New Jersey into New York Harbor; in *North Dakota v. Minnesota* there was a bill to enjoin Minnesota from constructing cut-off ditches in the Mustinka River, thereby increasing its speed and raising the level of its outlet, Lake Traverse, and causing the Bois de Sioux, an outlet of the lake, to overflow and greatly injure the value of farm land in North Dakota.

Thus it will be seen that in the cases cited by the Special Master the issues involved were those of polluting and adding to the flowage, but none of the cases are authority on the point of the taking or the diverting of the water. The cases require that a threatened invasion of right must be of serious magnitude and established by clear and convincing evidence when the invasion is in the nature of pollution or adding to the flowage, but when the invasion is in the nature of a diversion or a taking which is substantially a taking of property, then the mere taking is sufficient even of itself without the necessary proof of the actual amount of money damages.

Under the common rule of both the States of Massachusetts and Connecticut the right exists to have the waters of a stream flow through the land of riparian owners undiminished in volume—that this right is a property right which

becomes vested in each riparian owner in the same manner as other property rights and which can only be taken from a citizen by due process of law by a sovereign to whom he owes allegiance for the purpose of some public use and for which he must be compensated.

The right of each state to adopt a common law doctrine is admitted and it has been decided that no state can legislate for, nor impose its own policy upon another state, and that Congress can not enforce any particular rule or doctrine upon any such state. Therefore, one state by means of its legislative power cannot take nor authorize the taking of property located in another state. The effectiveness of a state law ceases at its borderline, the principle being the rights of a property owner on being invaded and such invasion in itself is sufficient injury to warrant the court in prohibiting the taking. The State of Massachusetts has no power to take property situated beyond its boundaries and the State of Connecticut has never authorized the taking. In such a case the United States has no power to authorize the diversion.

It is significant that the Supreme Court in every instance speaks of "the threatened invasion of rights" and states that it must be "of serious magnitude." If the Court had meant that the threatened *damage* must be of serious magnitude it would have said so. It is the claim of the Complainant that the words "invasion of rights" mean exactly what they say, that if the Complainant can show that a right has been actually and seriously invaded by the State of Massachusetts, the Complainant is entitled to injunctive relief.

The injury by a taking of real property rights without consent of Connecticut justifies an injunction

Unquestionably either in Connecticut or Massachusetts, in a suit between private parties the complainant who has

presented a case in which the Court finds actual injury to property rights would be entitled to an injunction to prevent present and future injury to such rights. His rights would be protected by the Constitution of his own State and also by the Constitution of the United States. Can a sovereign state be accorded less consideration?

VI. NAVIGATION

Navigation on the Connecticut River may be divided, for the purpose of discussion, into two sections: The first section being between Hartford, Conn. and Holyoke, Mass. and the second between Hartford, Conn. and Long Island Sound.

Navigation actually exists between Hartford, Conn. and Holyoke, Mass.

There have been numerous reports by Army Engineers recommending the establishment of a navigation project on the Connecticut River between Hartford, Conn. and Holyoke, Mass.

Congress has adopted a definite project and appropriated money therefor.

At the time of taking testimony no project had been adopted by Congress for the section of the River between Hartford, Conn. and Holyoke, Mass., but under an Act of Congress approved July 3, 1930 (Public—No. 520—71st Congress) (H. R. 11781) which was entitled, "An Act Authorizing the construction, repair and preservation of certain public works on rivers and harbors, and for other purposes," there is included the adoption of the project reported by the Chief of Engineers under date of April 24, 1930 and printed in Rivers and Harbors Committee Document Numbered 36, Seventy-first Congress, second session. The act appropriates one million dollars to be expended upon the project.

The following is quoted from the act:

> "Connecticut River, above Hartford, Connecticut: There is authorized to be expended upon the project reported by the Chief of Engineers under date of April 24, 1930, and printed in Rivers and Harbors Committee Document Numbered 36, Seventy-first Congress, second session, subject to the conditions set forth in said report, the sum of $1,000,000, and subject to the further conditions that the Bulkley, or Memorial, Bridge across the Connecticut River at Hartford shall not be disturbed, and that the lock and dam described in the report as to be built near the city of Hartford shall not be constructed so near said city as to in any way disturb city improvements or otherwise interfere with the said city."

There is actual navigation between Springfield and Hartford particularly. It is not only navigated by pleasure boats, but there is some navigation for commercial purposes. (Herman Burgi, J. S. E., 48.)

There are locks now in existence and records are kept of the number of boats passing through these locks, said locks being in connection with the power canal between Windsor Locks and Thompsonville just below the Connecticut-Massachusetts state line. However, in a Federal Power Commission permit issued to the Northern Connecticut Power Company, provision has been made by the Chief of Engineers, U. S. Army, requiring the construction of adequate locks to accommodate navigation. (Jacobs, J. S. E. 55, Record, 329.)

Navigation will be affected by any diversions when the Hartford gauge is 4.5 feet or less.

Navigation between Hartford and Holyoke will be impeded by diversions from the waters of the Connecticut

River "during the period when the gauge is 4½ feet at Hartford." This is due to the pools and rapids in the river and the natural fall of the river between Windsor Locks and Hartford. (Joint Summary of Evidence, Page 49.)

Diversions will always occur at such gauge heights.

Under the Massachusetts legislation as restricted by the communications from the Secretary of War, it will be permissible to withdraw water at all times when the gauge at Hartford is over 2.1 feet and even when the gauge is 2 feet or below, it will be possible to withdraw water under the above legislation and restrictions on 29 days during the average year, thus adversely affecting navigation between Hartford and Holyoke at practically all times when it is remembered that the gauge at Hartford stands at 4 feet or less about 200 days in the average year (Ex. "C-25"). It will be seen that navigation in this section of the stream is affected very materially.

Navigation between Hartford and Long Island Sound is extensive.

In regard to the section of the river between Hartford and Long Island Sound the Master found (Report of Special Master, 12), that "a substantial commerce is carried on between Hartford and New York (and neighboring ports), both passenger business and freight business largely coal and oil. Regular lines of boats ply in this commerce between Hartford and New York and its neighborhood. The Connecticut River has long been treated by the United States as navigable from Hartford to the sea. An annual expenditure for years has been made by the United States in preserving and bettering this navigation."

Congress has adopted a definite project which has existed for many years.

A project from Hartford to Long Island Sound was adopted by Congress in 1880, providing for a ten-foot channel. On Feb. 27, 1911, Congress adopted the present project for improving navigation between Hartford and the Sound. The Act provides for a channel 100 feet wide by 12 feet deep at mean low water. (J. S. E., page 38.) Mean low water corresponds to 2 feet on the Hartford gauge.

The project depth has never been maintained.

Although it was the intention of Congress to provide a 12-foot depth of channel at mean low water (2 feet on the Hartford gauge), this depth has never been maintained. Actually 10 feet and not 12 feet has been the controlling depth between Hartford and Long Island Sound. This is 2 feet less than the project depth as authorized by Congress. (J. S. E., page 39.)

Between 3 and 4 feet on the Hartford gauge required to maintain fair navigation.

The navigable capacity of the stream is greater than that capacity which is provided for under the Congressional authorization. It was testified that even if the project depth were available at all times, barges could not be loaded to their full carrying capacity, but this was only possible at times when there was more water in the river than was provided for in the project depth. For this reason, the evidence showed, those men experienced in navigating boats on the river would prefer even greater depths than the project provides.

Jeremiah E. Beckwith testified: "That when the gauge at Hartford shows between 3 and 4 feet, the presence or absence of half an inch of water would make a difference in

navigating the river because the barges are only loaded to a 9-foot draft but could be loaded to another foot or two deeper and so bring up much more." (J. S. E., pp. 40-41.)

Thomas Reed testified: "With the Hartford gauge between 3 and 4 feet, if any water is taken out, it will have an effect on the draft; that anything loaded a little deeper will have to be lightened up a little; that the cargoes are all loaded by the stage of water occurring in the river; that the more water there is in the river the deeper the barges will be loaded." (Joint Summary of Evidence, page 43.)

William H. Hill testified: "That, from his observation when vessels have heavy loads, there is no more water than is needed when the gauge is between 3 and 4 feet at Hartford." (J. S. E., page 47.)

Robert J. Noble testified: "That the best and most economical period of navigation on the River is when there is from 6 to 7 feet of water on the gauge." (J. S. E., page 51.)

It will be seen from the testimony of all these experienced pilots and river masters that navigation is best carried on at depths 2 to 3 feet in excess of the government project, showing that the capacity of the river for navigation is greatly in excess, not only of that which is provided, but of that which is authorized by Congress.

Diversions will always occur at these gauge heights.

Diversions will always occur at gauge heights from 2 to 4 feet, since under the restrictions of the Secretary of War, water is only released when the Hartford gauge is 2.1 feet or lower. The Special Master found (page 17), that "the Swift River Reservoir, operated as required by the Secretary, would have increased the flow of the Connecticut 43.5 days during

each year on the average," but he should also have found that the same data (Ex. "D-36") which showed the increased flows, also showed that on 29 days during the same period when the Hartford gauge was 2 feet or less, water would have been diverted from the Swift River, thus reducing the flows in the Connecticut River and lowering the gauge at Hartford as much as 2½ inches. (Ex "C-41.") Furthermore, that at all times throughout the year when the gauge is above 2.1 feet, that diversions will be taking place, reducing the flow in the Connecticut River and effecting reduction in stages of as much as 6½ inches.

The Complainant (Exception 24) objects to the finding of the Special Master on page 18 of his report where he finds:

> "There is no proof of difficulty in navigation at times when the stage of water is 12 feet or even 11 feet, 11 corresponding to an indication on the Hartford gauge of 3 feet. The discharge required from the Swift River reservoir during low water periods will somewhat benefit navigation. I cannot see how the diversion can injure navigation and therefore find that the proposed diversions will not interfere perceptibly or materially with the navigation of the Connecticut."

The last sentence is evidently a conclusion predicated upon the existence of the two preceding statements of fact. *First* that navigation is not difficult when the Hartford gauge is between 3 and 4 feet and, *second*, that a benefit is derived from discharges from the Swift River Reservoir when the flow is low.

We have already shown by the testimony of Beckwith (J. S. E., p. 40), Reed (J. S. E., 43), Hill (J. S. E., 47), and Noble (J. S. E., 51), all navigators upon the river, that the river cannot stand any diversion of water when the gauge heights are between 3 and 4 feet without adversely affecting

navigation. And we have shown that there will always be diversions of water when the gauge is between 3 and 4 feet.

The suggestions of the War Department requiring a discharge from the Swift River Reservoir are limited to occasions when the gauge height at Hartford is 2.1 feet and less. Therefore there will be no benefit from such discharges when the Hartford gauge is between 3 feet and 4 feet.

For these reasons we cannot help but feel that the Master overlooked the relationship between the War Department's suggestions and the gauge heights at Hartford and reached an erroneous conclusion that the proposed diversions will not interfere perceptibly and materially with the navigation of the Connecticut.

Present navigation on the Connecticut River is difficult and expensive at low flows.

Unfortunately the project depth as authorized by Congress has never been completely carried out. The actual channel has never been 100 feet wide, nor has the channel ever been dredged and maintained at a depth of 12 feet. (J. S. E., 38-39.) It is found by those who navigate the river that a depth of 9 or 10 feet actually exists when the Hartford gauge registers 2 feet so that there is about 2 or 3 feet of navigable depth missing at such times. Under these prevailing conditions, navigation between Hartford and Long Island Sound, especially in times of low flow, is very precarious. During this period small amounts of water, even to a half inch in depth, are very material as an aid to navigation.

Testimony of Jeremiah E. Beckwith, J. S. E., 40; Charles R. Bacon, J. S. E., 45; Wm. H. Hill, J. S. E., 47; Robert J. Noble, J. S. E., 51; Thomas Reed, J. S. E., 43.

The damage to navigation because of actual conditions now existing is reflected in the rates which have to be charged for the transportation of various commodities on the river. Consequent delays, injuries to the hulls of vessels, and the light cargoes which have to be carried increase the cost of transportation which must be borne by the consumer (J. S. E., p. 53).

Two feet on the Hartford gauge is the point from which the project depth is reckoned.

While it is true that the War Department has provided for an increase in the flow of the stream during low water conditions, these restrictions only apply at times when the water is at 2.1 feet or less on the Hartford gauge, but the restrictions are not so worded either to increase the flow at all times when the gauge is at that point, or to prevent diversions at such times. Furthermore the restrictions do not protect the navigable capacity of the stream, because due to inadequate dredging it is not until the Hartford gauge reaches 3 to 4 feet that the project depth is available. There is no protection to the navigable capacity of the stream at these times.

Diversions will occur at 2 feet on Hartford gauge even under War Department suggestions.

Since diversions will occur 29 out of 72 days when the gauge is at 2 feet, it is clearly evident that the restrictions of the Secretary of War not only do not protect the navigable capacity of the stream, but do not protect the navigability of the channel as it is now developed or intended to be developed under the Congressional project.

No plans or specifications have ever been submitted for the dams and structures to be erected.

The Special Master failed to find "That the Commonwealth of Massachusetts, by any of its agencies of government, has

not submitted any plans or specifications as to any proposed dams, structures, or works to be built or constructed in either the Ware or Swift Rivers to either the Chief of Engineers or the Secretary of War, nor have any plans or specifications been recommended by the Chief of Engineers or the Secretary of War." (Exception 25.)

The record shows that under date of November 30, 1927, the Metropolitan District Water Supply Commission wrote a letter making formal application for a permit for the diversion of the waters of the Ware River and on the same day a similar letter, making formal application for a permit for the diversion of the waters of the Swift River. (Reprint of Answer, Appendix B, page 81, Appendix C, page 89.) No plans or specifications were submitted with either of these letters, nor have any been submitted since the letters were written. (J. S. E., 37.) In reply to the Ware River application, the Secretary of War approved a recommendation of the Chief of Engineers, as follows:

> "In view of the controversy before the Supreme Court, it seems inadvisable to issue a formal permit for the present but to inform the applicant that no objection will be interposed by the War Department to the diversion of the flood waters exceeding 85 million gallons per day for the period October 15 to June 15, of each year." (Reprint of Answer, p. 87.)

Further, in regard to the Swift River diversion, the Secretary approved the recommendation of the Chief of Engineers that the applicant be informed:

> (e) "From the studies of past records it appears there will be no substantial alteration or modification of the condition or navigable capacity of the channel of the navigable portion of the Connecticut River if the flow of water from the Swift River as provided in the terms of Chapter 321, of the Acts of 1927 (Massa-

chusetts) be augmented during the critical period from June 1 to November 30, both inclusive, so that the measured rate of discharge on the Swift River shall be 70 cubic feet per second on such days as the United States Geological Survey gauge at Sunderland, Massachusetts indicates the discharge of the Connecticut River at that point to be less than 4,900 cubic feet per second and more than 4,650 cubic feet per second and shall be further augmented so that the measured rate of discharge past the impounding dam on the Swift River shall be 110 cubic feet per second on such days as the Geological Survey gauge at Sunderland, Massachusetts indicates the discharge on the Connecticut River at that point to be 4,650 cubic feet per second or less." (Reprint of Answer, 99, 100.)

It will be noted that neither of these represent positive action granting these permits but virtually are only statements as to how far diversions might take place before the Secretary of War would intervene.

The rights of the federal government and of the states in regard to such matters as interstate waters and navigation go directly to the rights of sovereignty as between the federal government and the quasi sovereign states.

In discussing rights to flowing waters, we will commence with the powers of the state as they existed originally; *second*, the delegation of power to the United States, its scope and limitations; and *third*, the powers which still remain in the State after such delegation.

Distinction between ownership of land and use of water

In discussing rights to flowing waters, one distinction must always be kept in mind. Water as such must be considered apart from the channel, bed and banks over, along or through which the water flows.

In the discussion of questions arising as to the use of water for the many purposes to which it is subject, this fundamental distinction is very often lost sight of.

As to water itself, whether of a navigable or a non-navigable stream, there cannot be absolute ownership of the water. The only interest which any one sovereign or subject has in the water is the right to its beneficial use as it naturally flows.

Blackstone Com., Book 2, Page 18.
3 Kent's Com., Page 439.
Sweet *v.* State of New York, 129 N. Y., 316.

This right to the beneficial use of water is divided between a public use, *jus publicum*, and the right of the individual, or *jus privatum*. Each is dependent upon some sort of ownership in the bed and banks of the stream through which the water flows.

State's right to adopt policy covering its waters

One problem of a government having streams within its domain is to determine upon some policy as to the relative rights of the individuals who own property along the banks of the streams, because it is the ownership of the land through which the stream flows which determines the rights in water.

Massachusetts and Connecticut, two of our earliest states, substantially adopted the common law doctrine of the English government as to water rights.

On the other hand the western states, with a vast amount of arid land, decided that for the best interests of their states as a whole, a different doctrine should be established and an allocation of the waters made based upon priority of appropriation for use in the reclamation of arid lands.

It must be conceded that any state has the right to determine for itself which of these doctrines, in whole or in a modified form, is to be adopted as the law of that particular state. When taken—this action cannot be modified or changed by the United States or any power other than the State which determines the rule.

In substance Massachusetts contends that the State of Connecticut and its citizens are not entitled to the use of the flood waters of the Connecticut River as they are supplied through the tributaries, but only to some unknown portion of the waters which flow through the stream during the course of the year, called by the Commonwealth of Massachusetts "the normal flow of the stream"; and it is further claimed that the State of Connecticut and its citizens would be better off without these flood waters, and that because they would be better off, and because they are not entitled to them, the Commonwealth of Massachusetts has the right to take them.

Under the law of the two states, all persons having a right to the use of flowing waters are entitled to all of the water which naturally flows through the stream, whether it be at the time of flood or at the time of drought, or at some intermediate season of the year.

> Thompson *v.* New Haven Water Co., 86 Conn., 597.
> Nemasket Mills *v.* Taunton, 166 Mass., 540, 544.

The states and the citizens thereof, being entitled to all of the waters of the stream as they flow, it is for the states, through their legislative departments, to determine as a state policy if any portion of the waters of a stream, whether flood waters or not, is to be allowed to be taken for any other purpose than a riparian use.

State's right as to non-navigable streams

The common law doctrine provides that the riparian owners own to the thread or middle of the stream and as such owners of riparian land are entitled to the water as it is wont to flow, undiminished as to quantity and unimpaired as to quality. As to the waters of these streams or the riparian lands which carry with them the beneficial use of the water, the state has no more interest than it has in any other property in the state owned by individuals.

> "The state has no ownership in any part of unnavigable streams, nor any control over them, except such as it has in all parts of its domain for governmental purposes."
>
> (See 40 Cyc., 558;
> Home for Aged Women *v.* Commonwealth, 202 Mass., 422.)

This governmental purpose is the right to take property for a public use by the exercise of the power of eminent domain and it is only in this way that the sovereign can acquire for itself or for any one else the property rights in riparian lands and the use of water flowing through them.

Original power of states as to navigable streams

The original states of the Union secured their governmental powers from Great Britain in two successive ways. *First*, by grant of royal charters, and *second*, as a result of the Revolutionary War. The sovereignty secured by charter was not an absolute one so far as navigable waters were concerned. The powers of the Crown had been limited by the provisions of *magna charta* and subsequent rights conceded to the people. The powers of the government as such and the superior conceded rights of the individuals comprising that

government were differentiated. The life of the government was predicated upon the due respect and jealous safeguarding of the rights to which the people were entitled. Judge Koonce, O. C. E., in his lecture at the Engineer School at Fort Humphreys, Virginia, April 23, 1926, expressed the powers of the Crown as follows:

> "Thereafter, title to the land and water in the space between high water mark on each side of the river was vested in the King merely as a prerogative right incident to the power of government, and was held by him in trust for the public easement, or rights of navigation and fishery, the power to regulate and control which was vested in Parliament as representing the people. Upon the settlement of the American Colonies these rights passed to the grantees in royal charters in trust for the communities established."

To this might also be added the obligation of the Crown to recognize and protect the right of riparian ownership in the individuals along the streams. The colonies succeeded to both the powers of the Crown and of Parliament. In their set-up of government, the Colonies also differentiated these powers but in a substantially different manner. To the legislatures were given the powers of the Crown, but the powers reserved to the people were not entrusted to any representative body, but reserved for their own determination and control. Hence the so-called Bill of Rights which is a part of the several state constitutions and which appears as a part of the Constitution of the United States. It is a most significant fact that it was by the assurance of the passage of the first ten amendments to the Federal Constitution which set forth these rights, that it was possible to secure the adoption of the Constitution as originally prepared. It was not enough for the colonies or states to be assured that these rights were inherent; they demanded and secured a positive declaration to that effect.

The successful conclusion of the Revolutionary War transferred to the several colonies all of the powers and prerogatives of the English Government.

1 Farnham on Water and Water Rights, page 47, sec. 9.
27 R. C. L., 1371 and cases cited.
Pollard *v.* Hagan, 3 How, 212.
St. Anthony Falls Co. *v.* St. Paul, 168 U. S., 349, 360.
Shively *v.* Bowlby, 152 U. S., 1.
Johnson *v.* M'Intosh, 8 Wheat., 543, 595.
Martin *v.* Waddell, 16 Pet., 367, 408-410, 414.

The colonies' governmental interest in the waters of navigable streams assumed that of a trusteeship for the benefit of the people as a whole.

1 Farnham on Waters, page 533.
Mobile Tr. Co. *v.* City of Mobile, 187 U. S., 479.
27 R. C. L., 1371 and case.
Pollard *v.* Hagan, 3 How, 212.
Scott *v.* Lattig, 227 U. S., 229.
Donnell *v.* U. S., 228 U. S., 243.

As we have before indicated, the State as a sovereign has no ownership in the water itself. There is, however, the right in the general public of the State, common to all of its people, to use the water of all streams where it is possible, for the purpose of navigation. If any stream is in fact susceptible of being used for the transportation of persons or the transportation of merchandise the water of such stream becomes charged with use of the general public of that State for such purposes.

Ownership of bed and banks of stream

To insure this use for the benefit of all its people, the State, to this extent, holds the title to the land underneath such navigable water to high water mark on both sides of the

stream. In addition to insuring the use of the water of these streams, designed by nature to furnish a means of water transportation, the title in the State also permits of the development of navigation by work upon the land lying underneath these waters. So that there is in the hands of the State the governmental function of maintaining the navigable streams which in fact are found to be navigable and their development for the purpose of navigation to their fullest extent, or to their navigable capacity.

This title which is in the State to land lying underneath navigable waters gives the State no proprietary interest in such lands. It is only a prerogative right to protect, preserve and develop navigation.

St. Anthony Falls Co. *v.* St. Paul, 168 U. S., 349, 358, 365.
Shively *v.* Bowlby, 152 U. S., 1.

This right of navigation simply means that a method of transportation by water is a common right to all the citizens of the State. The title in the State is likened to the interest of the State in its land highways which is that of an easement.

Packer *v.* Bird, 137 U. S., 661, 667.
Grand Rapids Co. *v.* Butler, 159 U. S., 87.

Trusteeship for the public

The title which the State has in the land underneath the water of navigable streams is that of a trustee. It holds the land and incident to such title the use of the waters of such stream in trust for the benefit of the general public to use such waters primarily for navigation. In other words, before any other interest in the use of such waters is to be exercised such use must be secondary to the public right of navigation and such use must be exercised in such a manner as not to destroy

or seriously impair the public right of navigation. This title being in the state as a trustee for all of its people, it cannot be alienated without their consent.

Bradshaw *v.* Mill Co., 52 Minn., 59.
Vol. 3, Kent Com., 427.
Miller *v.* Mendenhall, 43 Minnesota, 95, 101, 104.

Individual rights

The same principle is true in the case of the individual as in the case of the state. There is likewise no individual ownership of running water. It is merely such rights as the individual may have to its beneficial use. These rights follow and are appurtenant to the ownership of the land over which the stream flows or the land adjoining the stream. These rights are known as riparian rights and the owners as riparian owners have the proprietary interests, and the extent of these property rights are determined by the common law of the state in which the stream is located.

St. Anthony Falls Co. *v.* St. Paul, 168 U. S., 358-365.
Packer *v.* Bird, 137 U. S., 661, 667, 669-671.
Kaukauna Co. *v.* Green Bay Co., 142 U. S., 254, 272.
Hardin *v.* Jordan, 140 U. S., 371, 382.
Kansas *v.* Colorado, 206 U. S., 46, 96, 97.
U. S. *v.* Rio Grande Irrigation Co., 174 U. S., 690, 704, 705.
Broder *v.* Water Co., 101 U. S., 274, 276.
Boquillas Land & Cattle Co. *v.* Curtis, 213 U. S., 339.

The States of Connecticut and Massachusetts are common law states and the common law rule as laid down by Chancellor Kent is as follows:

> "Every proprietor of lands on the banks of a river has naturally an equal right to the use of the water which flows in the stream adjacent to his lands as it was wont to run (*currere solebat*) without diminution or alteration. No proprietor has a right to use the water to the prejudice of other proprietors above or below him unless he has a prior right to divert it or a title to some exclusive enjoyment. He has no property in the water itself, but a simple *usufruct* as it passes along. *Aqua currit et debit currere et currere solebat* is the language of the law. Though he may use the water as it runs over his land as an incident to the land, he cannot unreasonably detain it or give it another direction, and he must return it to its ordinary channel when it leaves his estate."

The uses which the riparian owners might make of the water as it passes by their land included the right to use a reasonable portion of it for domestic purposes, the right to bathe in the stream and the right to use the water for manufacturing purposes. This last right, however, was predicated upon compensating the riparian owners along the stream in the event that it was either held back from or flooded the land of other riparian owners.

All of these uses, which attach to the riparian lands, contemplated the substantial return of the water used to the stream for the further use by other riparian owners below. There was no right attached to any riparian owner to so divert the waters of the stream that the water would be permanently withdrawn from the stream and the lower owners forever deprived of the use of such water.

Riparian rights, attaching to non-navigable streams, are of primary importance because by the common law of both Connecticut and Massachusetts, the riparian owners owned to

the thread of the stream. In the case of navigable streams, as we have already shown, the primary use of the water was for the common purposes of navigation. In such streams the use by the riparian owners, while it existed, was always subject to the common right of the general public to navigate the stream and the right of the state to improve the navigation of the stream. Yet subject to such rights, the riparian owners still possessed the same rights which they did upon non-navigable streams.

The rights in the riparian owners are vested rights of property, which under the constitution of the states cannot be taken from them except for a public purpose of the state in which they are located, and in all cases by due process of law which must provide compensation be made for the property rights taken.

To sum up, the states, before the United States was formed, possessed certain title to the bed and banks between high water mark of all its navigable streams. As an incident to this title, the state was entitled to the use of the water flowing therein for navigation purposes. The state for the benefit of all of its people held this land in trust for its people, a trust which was not alienable. The trust consisted in the maintenance of navigation by all of its citizens of its navigable streams and the right to improve such navigation should it so desire.

Intrastate, interstate and foreign commerce

The state also had the right to regulate and control all commerce over these navigable streams between the state and other states and between the state and foreign land. The state also had the obligation and duty not only to use the water in these streams for navigation purposes but to make certain that

any surplus water not needed for navigation should be at the disposal of the riparian owners for such beneficial use as they were entitled to.

Delegated powers of the United States

The framers of the Constitution of the United States recognized the restricted powers of the sovereign states, i.e., restricted as to each other, although unlimited within their own boundaries, and each state relinquished certain of its powers over the use of its navigable waters, by granting to the United States the power to regulate interstate commerce.

As to interstate and foreign commerce

As an incident to this power was the power to regulate, preserve and protect the navigability of the waters located within the several states for the use of the general public for interstate and foreign travel and commerce.

Under this delegated power, the United States acquired no title to the water, the bed nor the banks of navigable streams. Consequently, no power is lodged in any agency of the federal government to authorize directly or indirectly the taking away or diversion of any portion of the waters of navigable streams nor the disposition of any of the land under them. The waters may be used for some navigable purpose by or under the authority of the federal government but for no other purpose.

The powers vested in the United States have been repeatedly described as the duty to preserve and protect the navigability or navigable capacity of these instrumentalities of interstate and foreign commerce.

> United States *v.* Rio Grande Irr. Co., 174 U. S., 690.
> St. Anthony Falls Co. *v.* St. Paul, 168 U. S., 349.
> The Montello, 20 Wall, 430.

This power has also been expressed as the power of "regulating and improving navigation."

Gibson *v.* U. S., 166 U. S., 269.
U. S. *v.* Chandler-Dunbar Co., 229 U. S., 53.
U. S. *v.* Cress, 243 U. S., 316.
McCready *v.* Virginia, 94 U. S., 391.
Illinois Central Railroad Co. *v.* Illinois, 146 U. S., 387.

Also as the protection and encouragement of interstate commerce.

1 Farnham on Water & Water Rights, page 54, sec. 12.
Jolly *v.* Terre Haute Drawbridge Co., Fed Cases, No. 7441.
Texas and P. R. Co. *v.* New Orleans, 40 Fed., 111.

"The authority is given to Congress for the purpose of aiding, and not destroying, navigation and commerce; so that, although authority over the stream is absolute in execution of the trust imposed upon it, whatever obstructions it authorizes must be for the purpose of improving the navigation of the stream, or of facilitating commerce."

1 Farnham on Waters & Water Rights, page 60, sec. 14.

Includes navigable stream and its tributaries

The Ware and Swift Rivers are tributaries of the Connecticut River, a navigable stream, and some of their waters are concededly essential to present navigability of the Connecticut. This being so, makes their waters "navigable waters of the United States."

The fact that the War Department has already assumed jurisdiction over these waters and is prepared to limit the pro-

portionate part of these waters which it will allow to be diverted, is strong evidence that this Department considers them "navigable water of the United States." Otherwise, the United States would have no jurisdiction over them.

Navigable water of the United States has been held to mean:

> "A river, or other waterway, constitutes a navigable water of the United States, within the meaning of the aforesaid Acts of Congress, when it forms, by itself or by uniting with other waters, a continuous highway over which trade and travel is or may be conducted between the states themselves, or between the states and foreign countries."
>
> The Daniel Ball, 10 Wall, 557.

It has also been defined to mean:

> "Such waters are those which form, in their ordinary condition, by themselves or in connection with others, highways over which commerce is, or may be carried on with other states or foreign nations in the customary modes in which such commerce is conducted on water."
>
> 1 Farnham on Water & Water Rights, 67, sec. 15.
> U. S. *v.* Burlington & H. County Ferry Co., 21 Fed., 332.
> The Montello, 11 Wall, 411.
> Willamet Iron Bridge Co. *v.* Hatch, 19 Fed., 347.
> Miller *v.* N. Y., 109 U. S., 385.
> Neaderhouser *v.* State, 28 Ind., 257.
> Hickok *v.* Hine, 23 Ohio State, 523.

From these definitions it is evident that the stream in question, of itself, may not be navigable, but if it contributes to other water so that a channel of commerce is afforded for trade and travel between states or within the state, the water then becomes "navigable water of the United States."

All the tributaries of a navigable stream are within the class designated by our Courts as "Navigable Waters," under the care and regulation of the United States as such.

This principle has been recognized by the War Department in this case, where it has limited the diversion to be allowed from the stream.

The duty of the War Department is to protect and promote navigation—not to say how far it can be tampered with before injury results.

This principle has also been approved by the Supreme Court of the United States.

U. S. *v.* Rio Grande Irrigation Co., 174 U. S., 690.

Navigable capacity

A number of the cases involving the powers of the United States concerning navigable waters have mentioned the term "Navigable capacity." A distinction also appears in the Rivers and Harbors Act of 1899 between obstruction to navigable capacity, which can only be authorized by the affirmative Act of Congress and navigability, which is to a considerable extent within powers of the Secretary of War acting on recommendation of the Chief of Engineers.

There is no certain definition of the term, "Navigable capacity." Although the terms have been employed together to a considerable extent, it hardly seems probable that the term "navigable capacity" and "navigability" are synonymous.

One of the powers which the United States has always claimed and actually exercised for a great many years has been the power to improve the navigability of streams under its jurisdiction. So that a stream partially navigable in the

first instance may be improved by the Government and become wholly navigable; or where a stream is navigable only a portion of the year, by the improvements made by the United States or by the states it may become navigable during the whole year. The improvements authorized by Congress originally were confined largely to dredging and deepening the channels. Recently, studies have been made by the United States for the improvement of navigation by a control of the flow of the stream. The Government is now expending large sums of money in surveys, having as their objective the use or harnessing of the flood waters so as to improve the flow of the streams during dry periods and periods of injurious floods.

From this it seems that it is rather the potential or possible capacity for navigation which can be obtained by artificial improvements which should determine the navigable capacity of the stream rather than to say that the navigability as it exists should be the test.

As an example, if a stream be navigable for six months in the year, as nature has allocated the water, and not navigable during the other six months, but it should be found that by storing the surplus waters during the six months of plenty and permitting these stored waters to flow down the stream during the six months of drought, a continuous navigation of twelve months in the year could be obtained, it seems a reasonable claim that the navigable capacity of such a stream would be twelve months in the year instead of six months. In other words, navigable capacity is to be determined by the total amount of water available, so controlled as to provide the maximum of navigability.

The construction placed upon this provision by the Supreme Court of the United States in the recent case of *Wisconsin et al. v. Illinois and Sanitary District of Chicago* (278 U. S., 367) has been to place in the hands of the Secre-

tary of War, acting on the recommendation of the Chief of Engineers, the determination in the particular case of what constitutes an unreasonable obstruction. In that case it will be recalled that on two different occasions the Secretary of War decided that the diversion of 4,167 cubic feet per second and 8,500 cubic feet per second respectively from the waters of Lake Michigan was not an unreasonable obstruction to navigable capacity. The Court, however, found that insofar as the diversion authorized by the Secretary of War was not for a navigable purpose, that there was no authority in the Secretary of War to grant a permit for such diversion. The Court further stated (page 417):

> "The normal power of the Secretary of War under Section 10 of the Act of March 3, 1899, is to maintain the navigable capacity of Lake Michigan and not to restrict it or destroy it by diversions."

In other words, the diversion of water from any navigable stream for a purpose other than navigation is beyond the powers of the Secretary of War because of necessity it restricts navigable capacity.

The states having delegated to the United States the power to regulate and control interstate commerce, it necessarily follows that all the navigable water of the United States, which is susceptible to use for water transportation can be used by the United States to its fullest extent for navigable purposes. It may use the water within the same watershed, in the same stream or it may divert the waters or a portion of them from one stream into another; the only requirement is that some navigable purpose is to be served by this use of the water.

If the United States believes that the commerce will be best taken care of by the development of a new line of water

transportation, it may use any navigable waters of the United States to bring this about.

Where, however, there is water in a non-navigable stream which has not been a contributor to the navigability of a stream, the United States cannot obtain the use of this water except by the exercise of the power of eminent domain and the consequent payment of damage to the individual owners of the land bordering such non-navigable streams. This is a taking of private property for which the owner is entitled to compensation.

Cohen *v.* United States, 162 Fed., 364.

There is no ownership in the waters of any stream navigable or non-navigable in the United States. The most that the United States receives through the delegation of power to control interstate commerce is the use of the water to which the people of several states had in common to use such waters as a means of transportation and trade.

Trusteeship

To protect this common right before the adoption of the Constitution, the obligation to preserve and protect the common right of navigation and fishing in navigable water rested in the government of the states as trustees for the benefit of the general public.

By the adoption of the Constitution so far as these navigable waters were available or could be made available for any interstate or foreign trade or travel, the trusteeship to preserve and protect such water transportation was delegated to the United States and thereupon the United States became charged with the same trust which had been lodged in the states themselves. Such being the relationship between the United States government and the states, it is evident that neither the United

States nor any of its departments have the right to authorize, permit or allow any of the waters to be used or appropriated to any other use than that for which the trust is created.

It is claimed in Exception Twenty-sixth of the findings of the Special Master that the United States has no power or authority to permit the waters of an interstate stream to be diverted from its watershed into another and different watershed without the consent of both of the states through which the water flows; and, in Exception Twenty-seventh, that the Congress of the United States has no power or authority to permit the waters of an interstate stream to be diverted for any purpose other than the improvement of interstate and foreign commerce.

We have already discussed the relative powers of the United States and the several states as to the use of waters which are susceptible of being used for navigation purposes. The United States when it finds that the use of water is necessary, for the purposes of interstate and foreign commerce, has the right to use such waters for such purposes. There is also reserved to the states through which waters flow the right to use such waters for intrastate purposes; so that the use of flowing waters for navigation purposes where the stream flows through two states is divided between the three sovereigns; the United States, and that of each state through which it flows. After the use by the United States for purposes of interstate and foreign commerce has been satisfied, it is our claim that the water is still susceptible to the use by the two state sovereignties for purposes of intrastate commerce. This being so, the exclusive right to the disposition of any of these waters is not confined to any one of the three sovereignties entitled to such use. If the water is to be forever removed from any navigable purpose it is necessary that the consent of all three sovereignties should be had before such removal. It follows from this that the

United States cannot permit the transfer of any of the waters of an interstate stream from the watershed to which it is naturally attached, to some other watershed, without the consent of the two states through which the stream flows.

The only authority which Congress has to legislate concerning the use of navigable waters, is the constitutional provision delegating to the United States the power to regulate interstate and foreign commerce. This power limits the exercise by Congress to the use of water for navigable purposes. This power cannot be extended to authorize Congress to permit the use of any water of a navigable stream for a purpose not connected with navigation.

Wisconsin, et al. *v.* Illinois, et al., 278 U. S., 367.

In Exception Twenty-eighth it is claimed that, if Congress has the power to permit the diversion of waters of an interstate stream from one watershed to another, or if it has the power to authorize the use of navigable waters for purposes other than navigation, such powers cannot be delegated to and exercised by the Chief of Engineers and the Secretary of War; also that, if such delegation can be made, it has not been made under the provisions of Sections 9 and 10 of the Rivers and Harbors Act of 1899.

In the case of *Wisconsin, et al. v. Illinois, et al., supra*, the waters of Lake Michigan, by affirmative permit, were authorized to be diverted into the watershed of the Mississippi River, and the primary purpose for which the diversion was authorized is found a purpose not in aid of nor an improvement in navigation. The Court did not directly say whether or not the authority of the Secretary of War, in permitting the diversion from one watershed into another, was justified, because it was found that the diversion was not primarily for the purpose of aiding navigation in the watershed of the Mississippi River,

but was for the purpose of diluting the sewage of the Sanitary District of Chicago. At least the court held that the diversion for this latter purpose was unjustified and not within the powers of the War Department.

As to the diversion from one watershed into another, while recognizing that such question was raised in the case, the Court did not finally determine whether it could be done or not. It merely stated the proposition that thus far Congress had not authorized a diversion from one watershed into another; so that it may be said that the question of whether such diversion can take place or not is still undetermined. At least, there is nothing in the case which indicates that such a diversion can be delegated to the Secretary of War or that it has been delegated under the provisions of Sections 9 and 10 of the Rivers and Harbor Act of 1899.

Section 9, Rivers and Harbors Act, 1899

The Congress of the United States in drafting the Rivers and Harbors Act, approved March 3, 1899, has recognized the principles which we have thus far set forth in this brief in both Sections 9 and 10 of that Act.

Section 9, so far as applicable to this case, provides as follows:

> "That it shall not be lawful to construct or commence the construction of any . . . . dam . . . . . in any . . . . . *navigable river, or other navigable water* of the United States until the consent of Congress to the building of such structures shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of War."

The first requirement of this section is that a dam is to be constructed. There is nothing in this section which pro-

vides that the proposed dam shall in any way affect present navigation or navigable capacity. The only requirement is that it shall be a dam, and in this case it is conceded that a diversion dam is to be constructed in the Ware River and two dams for the impounding of water in the Swift River. This brings these two structures squarely within the terms of this section.

In Exception Twenty-ninth it is claimed that the proposed diversion dam on the Ware River and the proposed storage dams on the Swift River are dams within the meaning and intent of Section 9 of the Rivers and Harbors Act.

The second requirement is that the dam is to be constructed in any "navigable river, or other navigable water of the United States." For the purposes of this argument, it is conceded that the Ware and Swift Rivers are not "navigable rivers." So that to come within the terms of this section the waters of the Ware and Swift must be "other navigable water of the United States."

In Exception Thirtieth it is claimed that the waters of the Ware and Swift Rivers are navigable waters of the United States within the meaning of Section 9 of the Rivers and Harbors Act.

In this connection it should not be forgotten that the Commonwealth of Massachusetts must of necessity have concluded that these waters were within the term of "Navigable water of the United States," when they requested of the War Department a permit for the use of these waters as a water supply in another and separate watershed. It also should not be overlooked that the War Department so far considered these "Navigable water of the United States" that it has suggested certain modifications in the proposed plan for diverting these

waters, which it insists must be complied with or the department will have to object to the taking of these waters for such purposes.

We have already discussed the meaning of the term "other navigable waters of the United States" where it is claimed that a navigable stream includes of necessity the waters of its tributaries. The action of the War Department as set forth in the amended answer filed by the Commonwealth of Massachusetts is based upon the fact that the dams to be erected in the Swift River will have an effect upon the present navigability of the Connecticut River unless the Commonwealth of Massachusetts provides for the release of more water than its legislation provides for; and it is conceded by the War Department that unless it does so there would be grounds for federal interference in the operation of these dams. The only theory upon which the War Department will have any jurisdiction in this matter is that the navigable waters of the United States are in some way being affected by the construction of these dams. The Complainant claims that it is not within the province of the War Department to determine how far the Commonwealth of Massachusetts may interfere with the navigability of a stream where the interference is to be accomplished by the construction of a dam; that under this section of the Rivers and Harbors Act it is only by an Act of Congress that a dam can be built in any waters which are navigable in themselves or which contribute to the navigability of a stream to which they are tributary.

It does not appear in the record that any Act of Congress has been passed authorizing the construction of a diversion dam in the Ware River or any dams in the Swift River; that the waters of these two rivers, forming a part of the navigability of the Connecticut River, and being the waters of the United States, such fact must affirmatively appear in the

answer, if it is intended on the part of the Commonwealth of Massachusetts to rely upon some federal authority for making a diversion of the waters of these two streams.

It is also claimed that the second portion of Section 9 of the Rivers and Harbors Act provides that plans for such structures must be submitted to and approved by the Chief of Engineers and the Secretary of War; and that nowhere does it appear that any plans have been submitted to or approved by either or both of these officers of the government. The Complainant claims that until such action has been taken the Commonwealth of Massachusetts cannot set up any federal authorization for this diversion as a defense.

In Exception Thirty-first it is claimed that, as to the dams proposed to be built in the Ware and Swift Rivers, the plans and specifications must be submitted to and recommended by the Chief of Engineers and, approved by the Secretary of War, and the consent of Congress must be obtained for such structures, under Section 9 of the Rivers and Harbors Act.

It is conceded in this case than no plans and specifications have ever been submitted to or recommended by the Chief of Engineers, or approved by the Secretary of War, although the section of the Rivers and Harbors Act under discussion specifically provides for this action.

Under this section the questions as to whether it does or does not, or to what extent it may affect navigation, are left in the hands of Congress. All that the Chief of Engineers and the Secretary of War can do is to receive plans and approve them. The authority to allow the construction of the dams rests with Congress, and it is Congress alone which can authorize such construction.

The defendant has set forth the action of the Secretary of War upon applications for permits which were filed by the defendant. Under this section of the law these amendments to the answer do not add to the defense, inasmuch as they show upon their face that Congress has never approved or authorized the construction of any diversion dam in the Ware River or any dams for impounding water in the Swift River.

Nowhere is there any evidence showing that under the provision of Section 9 of the Rivers and Harbors Act of 1899 has Congress authorized the construction of any dams in either the Ware or the Swift Rivers; or that any plans have been submitted to or approved by either the Chief of Engineers or the Secretary of War.

Section 10, Rivers and Harbors Act, 1899

Section 10 of the Rivers and Harbors Act of 1899 may be divided into three parts. The first sentence provides as follows:

> "That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of the waters of the United States is hereby prohibited;"

In Exception Thirty-second it is claimed that a diversion of water from one watershed into another affects adversely the navigable capacity of the stream from which it has been taken.

Recognizing the principle that the total water in the watershed which contributes to the volume of water flowing through a navigable stream is the condition which must be preserved by the United States for the purpose of interstate and foreign commerce, Congress has reserved to itself the determination of what action it will take, should the navigable capacity of the navigable stream be jeopardized. It has expressly withheld from its administrative officers, the Secretary of War and the

Chief of Engineers, any power to authorize the disposal of any of these waters, or by agreed non-interference or other means allow any of the waters which form a part of the navigable capacity of a stream to be removed therefrom. Such removal must not be permitted without an affirmative Act of Congress.

If there is any distinction between the "navigable waters of the United States" as used in Section 9 and the term "waters of the United States" this section at least applies to the waters of the Ware and Swift Rivers if they have any "navigable capacity."

It seems fair reasoning to assume that any tributary of a navigable stream has some navigable capacity. Very few streams would supply sufficient water to be classed as navigable streams without the aid of tributaries. Consequently each tributary has a capacity and by furnishing its water makes possible the navigability of the main stream.

Therefore, it is logical to say that any interference with the flow of the tributary of a navigable stream is an obstruction to the navigable capacity of that stream, as well as the navigable capacity of the main stream.

This portion of Section 10 of the Rivers and Harbors Act of 1899 originally provided that the creation of any obstruction not affirmatively authorized by law to the navigability and capacity of any of the waters of the United States was prohibited. Under this phraseology it was held that the authority of the state was sufficient to interfere with the navigable capacity of a navigable stream.

> U. S. *v.* Bellingham Bay Boom Co., 176 U. S., 211, Act of 1890.

It was this decision which was responsible for the change in the wording of the statute.

Inasmuch as the War Department has taken cognizance of these diversions, and has specifically found that the navigable capacity of the Connecticut River is affected by the proposed diversions, the Complainant claims that it is necessary, if federal authority is to be set up as a defense to this action, to show some affirmative Act of Congress in order to constitute a valid defense to this action.

In Exception Thirty-third it is claimed that the affirmative Act of Congress, required in the first clause of Section 10 of the Rivers and Harbors Act, is not satisfied when the Chief of Engineers or the Secretary of War, by refusing to take or by abstaining from taking action to prevent a diversion of water from one watershed to another for a non-navigable purpose, allows such abstraction to be accomplished.

In Exception Thirty-fourth it is claimed that some affirmative Act of Congress is necessary and required, other than the specific powers which are given to the Chief of Engineers and the Secretary of War in the remaining two clauses of Section 10 of the Rivers and Harbors Act.

It is conceded that the second portion of Section 10 has no application to this case. The third part, so far as it is applicable to this case, reads as follows:

> "And it shall not be lawful . . . . . in any manner to alter or modify . . . . . the capacity of . . . . . the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

It is the claim of the defendant that it is under this portion of Section 10 that it filed its applications for permits to make these diversions, and that the action of the War Department as to the Ware and Swift Rivers, as set forth in the amendment

to the answer (Reprint of Answer, Appendix B, C), is sufficient authority, so far as the federal government is concerned, for them to proceed with the diversions.

In Exception Thirty-fifth it is claimed that the action of the Chief of Engineers and the Secretary of War in the present instance is not legally sufficient to authorize a diversion, because no plans or specifications for the work proposed to be done were ever submitted to or recommended by the Chief of Engineers, nor have any such plans and specifications ever been approved by the Secretary of War, as specifically provided in the third clause of Section 10 of the Rivers and Harbors Act.

Its purpose is to require a permit for work which will have to do with the widening or deepening or obstructing the channel of the stream, but not the diversion of water from the river. There is a considerable difference between the channel through which water flows and the water flowing through the channel; but even if this part of Section 10 did have any application, the action by the Chief of Engineers and the Secretary of War do not come within the terms of this section.

The defendant acknowledged the superior power in the government of the United States to permit the diversion contemplated by the Commonwealth of Massachusetts, and filed applications with the Secretary of War to make these diversions, but no positive permits have been received from the War Department.

But in neither one of these cases does it appear that any work or any construction or any diversion of water has been either recommended by the Chief of Engineers or approved by the Secretary of War. There is no provision of law which authorizes these two officers to do anything more than recommend and approve. Any other action upon their part is purely

voluntary, outside the scope of their duty in the premises, and furnishes no authorization to the Commonwealth of Massachusetts to proceed with its diversion of these waters.

Reserved powers of states

Of the several powers and duties in respect to waters which were possessed by the states prior to the adoption of the Constitution of the United States, only one was directly delegated to the federal government. That was the power to regulate and control interstate and foreign commerce. It is only when some interest connected with interstate or foreign commerce is involved that the United States or any of its departments has the authority to provide what shall be done concerning the waters of navigable streams.

The states reserved to themselves a title as trustee to the bed and shores of navigable streams to high water mark; the right to the use of the waters of all navigable streams for navigable purposes not inconsistent with their use for interstate and foreign commerce; as trustee to maintain, preserve and protect the rights of the public to navigate in all of these waters; and the guarantee of the vested rights of the riparian owners along the banks of these streams.

The rights of the several states and of the people under constitutions are guaranteed by the Fifth and Fourteenth Amendments to the Constitution of the United States. These provisions limit the exercise of all grants of power delegated to the United States, including the power to regulate and control interstate and foreign commerce.

U. S. *v.* Adair, 152 Fed., 737.
Adair *v.* U. S., 208 U. S., 161.
Wilson *v.* New, 243 U. S., 332.

In Exceptions Thirty-sixth and Thirty-seventh it is claimed that the finding of the Secretary of War that the diversion will

not injure appreciably or materially navigation on the Connecticut River, and that the United States is willing to release the waters of the river from the burden of interstate and foreign commerce, is not conclusive as to the use of the waters of this river for navigation purposes, and does not preclude the State of Connecticut from objecting to the removal of such waters from interstate, foreign or intrastate commerce.

So that the United States cannot in any way violate the rights of the people of Connecticut to have the use of all of the water contributing to the navigability of any stream used for such purpose until the navigability of the stream has been developed to its capacity. No more can the United States violate the vested property rights of riparian owners along such navigable stream to use all of the waters flowing in the stream whenever the purposes of navigation have been satisfied so long as such use is not an interference with navigation.

Under our constitution these rights of the people as a whole and of the riparian owners can only be protected through the action of the state in the sovereign capacity when these rights are attacked by another state or commonwealth. As to the people as a whole they can only be represented and their common rights protected by action of the state as trustee for them.

Thus the state is in duty bound to prevent any violation or impending violation of these rights of its citizens who are the beneficiaries of a public trust.

It is contended that if the War Department, through its Secretary of War and Chief of Engineers, has not the power to grant the applications of the Commonwealth and issue permits affirmatively authorizing the diversions sought, it is not within their province to inform the applicant that the department will interpose no objection to the proposed diversions if

the amount of water specified by them is all that is to be diverted. This was the action taken on the Ware River application.

If the applicant was a riparian owner upon these rivers and intended to use the water for a legitimate riparian use, this position might be sustained. The United States would then say, in effect, to a riparan owner so far as interstate commerce is concerned, your use will not at present interfere with the navigation on the Connecticut River and we will not object to your exercising your riparian rights to use it. In such a case, however, the riparian owner in using the water does so subject to the right of the United States to stop his use at any time that interstate or foreign commerce requires the return of that water to such use. Besides, his exercise of user is not exclusive and all others on the stream can use the same water for their own needs as riparian owners. There is no complete withdrawal of the waters from the stream. They are returned, after his wants are satisfied, to the stream for the common use of all others below him on the stream.

This is not the situation in the present case. Here the use by the Commonwealth of Massachusetts withdraws the waters entirely from the stream and their subsequent use by other riparian owners. The United States in this instance is not releasing to someone who has a proprietary right to use these waters but to some one who has no proprietary title in their use. They are not released by the United States for a riparian use. They are not released for a purpose connected with navigation.

The United States has nothing to give in the way of title to these waters and release of the waters from the easement of use for purposes of interstate and foreign commerce immediately tends to divest the states through which the stream flows and the riparian owners of their respective rights in the use of those waters.

Such being the case there is no right in the United States to aid, assist, encourage or allow the use of these waters for a non-navigable purpose by someone who has no reversionary right to their use.

Except as the owner of riparian lands and except for the purpose of regulating interstate commerce, the United States has no property in or sovereignty over the streams or watercourses within the boundaries of the several states. The sovereignty and ultimate control is in the state or in the riparian owner, or in both, according to the constitutions and laws of the several states, and the power of the Federal Government over the streams is no greater in the so-called public land states than in the states east of the Mississippi River.

Kansas *v.* Colorado, 206 U. S., 46, 92.

When the War Department issues a permit it is careful to protect both the rights of the states and the rights of individuals. There appears in each permit the following language:

> "NOTE—It is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State or local laws or regulations, nor does it obviate the necessity of obtaining *State assent* to the work authorized. *It merely expresses the assent of the Federal Government so far as concerns the public rights of navigation.* (See *Cummings v. Chicago,* 188 U. S. 410.)"

These permits also contain the provision that they are revocable at the pleasure of the War Department when it is found that the interests of navigation require such revocations.

In the case of the Ware River no restrictions appear. The applicant was informed:

> "Referring to your application of November 30, 1927, for *federal authority* for the diversion of the flood waters of the Ware River for an additional supply for the Boston Metropolitan District, this office has been directed by the Chief of Engineers to inform you that *no objection will be interposed by the War Department* to the diversion of the flood waters of the Ware River exceeding 85,000,000 gallons per day for the period October 16 to June 15 each year." (Italics are ours.)

There is no provision that property rights must be respected, that the states through which the water flows must assent, nor that the objection can be recalled at any time. To say that this is not in effect a permit is rather begging the question. What greater latitude of action could have been extended to this applicant if the authorization had been positive rather than negative. It was merely effecting the same result in a different manner.

In Exception Thirty-eighth it is claimed that the jurisdiction of the United States does not extend beyond the use of water for interstate and foreign commerce.

Even assuming that the United States has the exclusive right to determine how far the waters of a navigable stream may be used for interstate and foreign commerce, and even assuming that the United States has the exclusive right to restrict and reduce the use of these waters for such purposes, it certainly can have no right to say that such waters may not be used for navigable purposes other than interstate and foreign commerce. There is always left the reserved right in the states through which the stream flows, to use its navigable waters for transportation purposes within its own domain, regardless of whether the United States cares to use them for interstate and foreign commerce or not.

VII. POWER

There is an existing water power site

The Special Master found that there was one possible power development site on the Connecticut River in the State of Connecticut:

> "This is at King's Island in Connecticut near the state line where 4,000 horse power is now developed at a 24 foot head. The company which owns this power has been authorized by the Federal Power Commission to build a higher dam to develop approximately 50,000 horse power." (Report of Special Master, p. 20.)

It is susceptible of development

The present power site is capable of development into a large hydro-electric plant. The methods of construction and the general plan of procedure to develop this power have been worked out by the company and are described in the testimony (Joint Summary of Evidence, page 54). This plan provides for the building of a dam further down the river than the present dam but to the same height as the present dam, thus avoiding the use of long canals for the transportation of water. In this way it is proposed to develop a plant of 50,000 horse power capacity.

These plans have been approved by the Federal Power Commission

The present dam and power development on the Connecticut River are owned by the Northern Connecticut Power Company. This company prepared plans for the development at King's Island as described above and submitted them to the Federal Power Commission. The project was authorized by the Federal Power Commission January 18, 1928, and accepted by the Licensee on January 25, 1928, a permit being issued on

February 1, 1928. This permit was issued by the Federal Power Commission after its investigation and (Joint Summary of Evidence, page 55) after it had satisfied itself that the company had complied with the laws of the State of Connecticut and the Commonwealth of Massachusetts and was able to carry out the proposed plans.

The Commission has found that the company is able to carry out the development

Exception is taken to the finding by the Special Master, page 20:

> "This work so far as the testimony shows has not been resolved on by the company, and so far as shown the required capital has not been subscribed or arranged for." (Report of Special Master, pages 20 and 21.) (Exception 39.)

Mr. Jacobs testified, Joint Summary of Evidence, page 55, that the permit issued by the Federal Power Commission was issued after the Commission had satisfied itself of the *ability* of the Northern Connecticut Power Company to carry out the proposed plans. Complainant claims that there is no necessity imposed upon it for producing any other evidence of the financial ability of the Northern Connecticut Power Company. It is to be supposed that the investigation by a federal organization, such as the Federal Power Commission, as to the ability of a public service corporation to carry out a project for whose development it had requested a permit, is a sufficient proof, upon the issuance of permit. The finding of the Special Master that "so far as shown the required capital has not been subscribed or arranged for" (Special Master's Report, page 21), is contrary to the evidence. Complainant claims that the demonstration of financial ability as attested by the permit granted by the Federal Power Commission, comprehends the ability to arrange for subscriptions to capital.

The power will be substantially reduced by proposed diversion

The testimony is undisputed that enough water will be diverted from the Connecticut River to reduce the amount of power which can be generated at the power plant in Connecticut by 1,850,000 kilowatt hours per year (Joint Summary of Evidence, pages 54, 55, 56) according to Massachusetts legislation and by 1,320,000 kilowatt hours per year under the restrictions of the Secretary of War.

The percentage of decrease in productive results of the proposed development was conceded to be one per cent under the diversion project as outlined by the Massachusetts legislation and three-fourths of one per cent if the project is modified according to the suggestions of the War Department.

In the case of *Whitney v. Fitchburg Railroad Company*, 178 Mass. 559, the owner of the mill pond, claiming it to be capable of developing 200 h.p. per day, sought an injunction against the diversion of water from the pond, which diversion would reduce the power capacity of the pond 26/100ths h.p. or a little over one-tenth of one per cent of the total power capacity of the mill pond. The Supreme Court of Massachusetts granted the injunction on the grounds that such an interference with the power capacity was a substantial one, and stated that it was, therefore, unnecessary to pass upon the question as to whether or not an injunction would be granted regardless of substantial damage. The Special Master should have found, therefore, that this natural resource of the State of Connecticut is substantially damaged and depreciated and its development retarded by this loss of energy as claimed in Exception 41.

Such damage is material

It is set forth in Exception 44 that the Special Master should have held that such a damage is material; such a

quantity of power is sufficient to care for the lighting of many homes in the state practically in perpetuity. Money damages will amount to at least $7,920 per year. The Special Master found that "giving allowance for water released at times of low flow in accordance with the Secretary of War's requirements, the loss of power attributable to the diversion will amount to $7,920 per year, valuing each kilowatt hour loss at six mills." (Report of Special Master, page 21.) This amount when capitalized at 5% is equivalent to a capital loss of $160,000. The Special Master then proceeded, "from this should be deducted $80,000 representing a saving in capital investment resulting from the required addition to water in low flow furnishing 1,000 additional horse-power at low stages; this increase of minimum power would cause a corresponding decrease in steam-power plant, which will be required to supplement the water in times of low flow. This $80,000 deduction was testified to by Mr. Weston Fuller whose testimony was not questioned."

In Exception 40 the Complainant objects to the money damage loss as found by the Special Master.

The record shows that the figures for this $80,000 deduction were questioned and that the records failed to support the assumption of the witness who had made the calculations.

Mr. Weston E. Fuller, an expert witness for Massachusetts, testified,

> "That water power development operated in connection with a public utility during the dry weather season is operated to the best advantage to take care of the peak load during the day; in other words there are certain hours during the day, perhaps four hours when the load is very heavy. Now, if there is a pondage provided so that water can be drawn at a high rate for a short period, then this water power can be drawn upon so as to relieve the entire system during these four hours." (Joint Summary of Evidence, page 56.)

The records do not show that there is to be provided any "pondage," as referred to by Professor Fuller or that, were such pondage provided, the water could be drawn at a high rate for a short period of time when the load is very heavy; in fact the testimony in regard to navigation requirements during times of low flow would certainly indicate that it would be impossible to utilize this type of operation.

Further Professor Fuller testified,

> "The release of water from the Swift River during the dry weather period is worth a good deal to the power company at Thompsonville; that during the dry weather there is probably about 80 cubic feet per second which is let down the river in excess of what would come down under normal conditions; that is, the total let down is 110 cubic feet per second and the dry weather flow of the river goes, at times as low as 20 cubic feet per second, and he took it at 30 cubic feet per second, which leaves 80 cubic feet per second as the increase in dry weather flow." (Fuller, J. S. E. 56-57.)

This assumption was entirely refuted by the figures in Defendant's Exhibit 36 and Complainant's Exhibit 41 which demonstrate that it would be impossible to reduce the capacity of steam standby plants as suggested by Professor Fuller and estimated by him to be worth $80,000 by such regulation because during the critical low flows of the Connecticut River these Exhibits show that on many of the really critical days (averaging 29 days per year on Ex. D-36), water would have been diverted from the river and no increase added, so that it would still be necessary to have the same standby capacities.

Possibly this can best be illustrated by a specific example as shown on page 4 of Complainant's Exhibit 41. This shows that on November 18, 1924, the stage of the Connecticut River at Hartford was 0.0 indicating a very low flow and

yet on this critical day the river would have been subject to a diversion of 31 cubic feet per second even under the restrictions of the Secretary of War. Consequently there is no increase which can be relied upon to take care of the capacity of the plant during the dry weather flows. Increase of low flows is neither guaranteed under the legislation nor assured by the restrictions of the Secretary of War. There is, therefore, no saving in steam standby plant of 1,000 horse power as testified to by Professor Fuller (Joint Summary of Evidence 57) and as found by the Special Master's Report (page 21).

Neither State nor its citizens can be compelled to accept money damages for loss of natural resources

The Special Master having found that the "Massachusetts diversion of the Ware and Swift waters will cause an injury to the power of $80,000" (Report of Special Master, page 21) erred in finding that this Court could require "Massachusetts to pay to the power company or its assigns $80,000 if and when the power is developed to the extent stated." (Exception 42.) This property is property located in the State of Connecticut. The Commonwealth of Massachusetts has no authority through its Great and General Court to take property located in Connecticut. There is no authority residing in the legislative department of the United States to authorize one state to take property situated in another state, and no legislative power existing which can authorize the taking of this property unless it be that the State of Connecticut might authorize the taking of the property of its citizens for public use in the State of Connecticut.

8 Harvard Law Review 138.
New York City *v.* Pine, 185 U. S. 93.

Both of the Acts in question (Acts of 1926, Chapter 375 and Acts of 1927, Chapter 321, Mass. Reprint of Defendant's

Answer, Appendix B and C), make provision for an award of compensation to be made by the Courts of *that Commonwealth* but this provision only affects the citizens of another state when they either desire or are willing to have the question considered by the Courts of the Commonwealth of Massachusetts; but no matter what the effect of this legislation might be upon the individual citizens of another state, it certainly can have no effect so far as the sovereign power of another state is concerned. One state has no right by legislative enactment to force another sovereign state to accept damages for any injury to its sovereign rights; such a doctrine would deny the fundamental principles of sovereignty.

> "It is not lightly to be required to give up *quasi*-sovereign rights for pay; and, apart from the difficulty of valuing such rights in money, if that be its choice it may insist that an infraction of them shall be stopped."
>
> Georgia *v.* Tennessee Copper Co., 206 U. S., 230, 237.

Natural resources cannot be taken from a state without its consent

In our Exception 43 we claim the Special Master erred in finding that the natural resources of one state can be taken by another state and that this Court can require the payment of damages.

In *Hudson Water Company v. McCarter*, 209 U. S., 349, 357, it was said:

> "But it is recognized that the state, as *quasi*-sovereign and representative of the interests of the public has a standing in court to protect the atmosphere, the water and the forests within its territory, irrespective of the assent or dissent of the private owners of the land most immediately concerned."

And further at p. 357

> "It finds itself in possession of what all admit to be a great public good; and what it has it may keep and give no one a reason for its will."

In *Georgia v. Tennessee Copper Co.*, 206 U. S., 230, this is said:

> "This is a suit by a state for injury to it in its capacity of *quasi*-sovereign. In that capacity the state has an interest independent of and behind the titles of its citizens, in all the earth and air within its domain."

And in *Kansas v. Colorado*, 206 U. S. 46, 49,

> "One cardinal rule, underlying all the relations of the states to each other, is that of equality of right. Each state stands on the same level with all the rest. It can impose its own legislation on no one of the others, and is bound to yield its own views to none."

The facts in this case are entirely different from the situation in *New York v. Illinois and Sanitary District of Chicago*, 274 U. S. 488, in which the court stated, page 489,

> "But it does not show there is any present use of the water for such purposes which is being or will be disturbed; nor that there is any definite project for so using them which is being or will be affected. The waters are international and their use for developing power may require the assent of the Dominion of Canada and the United States. No consent of either is shown."

The case of *New Jersey v. Sargent*, 269 U. S., 328 cited by the Special Master in his report (p. 21), was a bill brought by the State of New Jersey against the Attorney General of the United States and members of the Federal Power Commission, alleging the unconstitutionality of certain portions of the Federal Water Power Act. The State of New Jersey alleged,

as part of its case, that under the conditions of the Act in question certain damages would result to contemplated power developments at sometime in the future. Concerning this allegation, the Court says (at p. 339) concerning the fact that certain applications had been filed with the Commission for the development of the water power resources:

> "As the applications are not further described, it must be assumed that the permits are sought, as the Act provides, 'for the sole purpose of maintaining priority of application for a license;' "

and the Court goes on to discuss the effect of these provisions complained of as follows:

> "These restrictions and conditions are assailed in the bill as passing beyond the field of Congressional power and invading that reserved to the State. But whether they are thus invalid cannot be made the subject of judicial inquiry until they are given or are about to be given some practical application and effect. *Naturally this will be after they become part of an accepted license*, and after some right, privilege, immunity or duty asserted under them becomes the subject of actual controversy." (Italics are ours.)

It will thus be seen, that the Court specifically states that in a situation such as this, where a utility has reached the point of having had its application for a power development presented to the Federal Power Commission and a permit issued thereon, and that permit accepted by the utility, any interference with the rights of the utility in the water so to be developed are such as constitute a proper subject for judicial inquiry and relief.

The records show in this case that not only is there a "definite project" which will be affected, but that a definite branch of the government, the Federal Power Commission, has investigated, approved and issued a permit for it. The facts in

New York v. Illinois, supra, were that it was an international stream and the water power companies at Niagara Falls were precluded under the international joint treaty from the diverting of any more water than was then being diverted for power purposes.

An injunction should have been granted

In Exceptions 45 and 46 we claim that the Special Master having found damages in Connecticut to the extent of at least $80,000, should have granted an injunction. In a damage such as this, which is of a recurring nature, continuing from year to year, monetary damage need not be accepted and no pecuniary standard need be set up. Injunction is, therefore, the proper procedure and remedy in such cases.

> Van Etten v. New York City, 226 New York, 483.
> Georgia v. Tennessee Copper Co., 206 U. S., 230.

> High on Injunctions, 4th Ed., p. 14, Sec. 9 . . . "But where the act complained of is such that by its repetition or continuance it may become the foundation of adverse rights equity may interfere by injunction altho no actual or substantial injury be shown."
>
> (p. 759), "Sec. 794 . . . . . As an incident to the ownership of the adjacent soil, a riparian proprietor has an interest of a usufructuary nature in the water flowing past his land, which equity will protect. This right or interest being common to all owners of land adjacent to a stream, no proprietor can, in the absence of a right to exclusive enjoyment, use the water in such manner as to injure adjoining proprietors. Nor can he, unless authorized by adjacent owners, divert the water from its natural course, to the injury of the owner below, or change its quality, or diminish its quantity, or cause it to flow back upon the proprietor above.
>
> * * * * *
>
> The jurisdiction of equity in this class of cases may be regarded as ancient and well established. It is

founded upon the pressing necessity of immediate relief being granted where, in the absence of such relief, permanent mischief and lasting injury might result, and also rests upon the necessity of preventing multiplicity of suits."

Holsman *v.* Boiling Spring Bleaching Co., 14 N. J. Eq. 335.

(p. 278) "Sec. 305. *Diversion prevented.* Since from the nature of the case, the injurious effect of a diversion of water, to the deprivation of him having the right to its uninterrupted flow, is necessarily vague and incapable of accurate ascertainment, and consequently not susceptible of satisfactory adjustment in an action at law, it is held that continuous diversion of water from its bed is of itself an irreparable injury."

Corning *v.* Troy, etc., Factory, 39 Barb., 311.
Crownen *v.* Wellsville Water Co., 3 N. Y. S., 177.
Amsterdam Knitting Co. *v.* Dean, 43 N. Y. S., 29, 13 App. Div., 42.

VIII. AGRICULTURE

Inundations of Meadow Land an Annual Occurrence

It was found by the Special Master (Report of Special Master, page 20):

"The benefit from inundation of the 9,500 acres of hay land is exceptional."

In Exception 51, the Complainant objects to this finding of fact. The testimony of the owners of these meadows, who have used them for a great many years, shows that these annual inundations have been a regular part of the flow of the Connecticut River. Some of these lands have been in the family of the witnesses since 1701, even before Connecticut became a state. Rather than being "exceptional" these annual

floods or freshets have always been depended upon by the owners of the meadows as the sole fertilizer to furnish them with two crops of excellent hay each year. In many cases, it has been this natural fertility which has been the cause for acquiring these lands, and in addition, has been the cause, in at least one instance, of the land owner purchasing a farm in the vicinity of these meadows so as to derive the benefit he desired from this inundated land.

Necessary to Lands along the River

After reviewing the testimony, all of which showed the beneficial effect of these flood waters, the Special Master found:

> "The land owners who testified showed that the hay lands were not of uniform elevation; that sometimes small areas are not submerged resulting in a diminshed crop." (Report of Special Master, page 20.)

The record was complete in showing, both by the evidence of the land owners and by the expert testimony of Dr. Morgan, a soil expert, that the periodic flood waters of the Connecticut valley bear a silt which is valuable for fertilizing purposes. There are approximately 9,500 acres of hay land on the banks of the Connecticut River as well as 1,650 acres of land devoted to other crops, all of which land is covered by the annual inundations. Because of the fertilizing value of these inundations, these lands have been enhanced in value. It is not now nor never has been necessary to fertilize the land, but the fertility of the soil is solely dependent upon the reliability of the flood waters continuing each year. An exceptionally good quality of hay is grown on these lands without artificial fertilization, resulting in two crops a season of a quality of hay which can not be produced on the higher lands not subject to inundation, and Morgan found the quantity per acre to be in excess of the average yield per acre of all hay lands in Hartford County.

(J. S. E., page 80.) While the topography of the land is such that the land on the banks of the stream may be dotted here and there with knolls which sometimes in ordinary flood are not inundated, yet the higher the flood stages are, the more land is inundated; and not only that greater area is covered, but more of the beneficial silt is deposited, due to the deeper flows, and hence a better crop is obtained. The more water which covers the land actually flooded, the better the crops.

(Joint Summary of Evidence Carrier, page 58; Isaacson, page 60; Hale, page 63; Howe, page 65; Hanmer, page 66; Hardin, page 67; Dunham, page 68; Hollister, page 69; Goodrich, page 70; Adams, page 71; Christiansen, page 73; Newberry, page 74; Stipulation, page 75 and Morgan, page 76.)

Higher Flows will be Decreased Materially

The abstraction of these waters as proposed by the Massachusetts legislation, either with or without the restrictions of the Secretary of War, will materially reduce the height of the water during the period when the river is in flood or freshet stage.

The U. S. Weather Bureau fixes 16 feet on the Hartford gauge as "flood stage." It is when this height exists and when the gauge registers above this figure that Massachusetts proposes to divert the most water. At 16 feet and upward, the diversion will reduce the height of the water from 3 to 5 inches on the average and at times as much as 6.5 inches. (Joint Summary of Evidence, p. 29.) (Ex. C-6 and C-6A.) A reduction of 3 inches will materially affect the inundated land as well as reduce the area which would otherwise be flooded. (Morgan, J. S. E., page 78.)

These reductions may sometimes be sufficient not only to reduce the height of the water and the amount of area flooded, but to entirely prevent the flood by so reducing the flow of the stream that on certain days the water will be confined to the banks of the river or below the sixteen foot stage, as shown in Complainant's Exhibit C-6A during May, 1914; May, 1919; April, 1920; March, April and May, 1921; April, 1923; April, 1924; and February, 1925.

Loss of Water means Loss of Fertilizing Material

By the withdrawal of this water, the fertilizing material which would be brought down by the floods and deposited on the Connecticut River meadows will be materially decreased, since the fertilizing effect of these floods is dependent primarily upon the height of the waters over the land and the amount of land inundated. Testimony of Dr. Morgan (J. S. E., page 78).

Damage to City Can and Is Being Eliminated

During the trial of these proceedings, it was suggested that the floods which had such an exceptional value to the hay lands of the Connecticut valley may at other parts of the valley be causing damage. No testimony was offered in regard to this alleged flood damage, but reference was made to special acts of the General Assembly authorizing a bond issue for the construction of certain dikes in the South Meadows. The Mayor of the City of Hartford testified that

> "So far as any advocacy that he personally made in connection with the dike and its building, was predicated solely upon the desire of the present administration to see that the land was developed as an aviation center"

and he further testified

> "that there was nothing down on the South Meadows to protect until the development of aviation."
>
> (Joint Summary of Evidence, p. 83.)

Notwithstanding this, the Special Master found

> "It needs no testimony to prove that floods and inundations frequently cause damage. The Mayor of Hartford in this case showed dikes built at considerable expense in Hartford to fend off Connecticut river floods."
>
> (Report of Special Master, pp. 19, 20.)

To this finding of the Master we have objected in Exception 47. The Special Master should have found that dikes along the South Meadows were only in connection with the development of a landing place available for both land and sea planes.

Furthermore, the record shows that, insofar as any damage might be effected by floods, the city has already taken the necessary action for its protection in the future by the construction of these dikes.

Injury to Inundated Lands is Material

The Special Master found

> "On the whole I think the damage to the hay land is not shown to be of 'serious magnitude'; and that such damage, far from being 'established by clear and convincing evidence,' is shown by no evidence making it possible of computation or proving that it is large."
>
> (Report of Special Master, p. 20.)

In Exceptions 48, 49 and 50 to the Report of the Special Master we claim that the evidence shows that the agricultural

land in the Connecticut Valley will be materially damaged by the proposed diversions.

The stipulation (J. S. E., p. 76) shows 9,500 acres of hay crops actually dependent upon the flood waters of this river for fertilization. In addition to lands which are used for hay there are other crops being raised in the valley on these lands which are inundated annually. Such other crops include 750 acres of tobacco, about 480 acres of corn, about 250 acres of vegetables, 142 acres of pasture, and 28 acres of potatoes. (J. S. E., p. 77.)

The testimony shows that farmers depend and rely upon the right to so utilize these flood waters and if this right is taken away that they will not be able to use the land in the same economical way as they are now doing and as has been done in the past for many years. In fact testimony shows the use of these meadows since 1701. (Hale, J. S. E., p. 63; Goodrich, J. S. E., p. 70.)

There was also testimony by individuals that this damage would be considerable to each of them. The stipulation further states that other farmers owning land in the Connecticut valley were present in court and prepared to testify as to the damage which they would sustain.

Amount of Damage in Dollars Immaterial

The Special Master found

> "The benefit from inundation of the 9,500 acres of hay land is exceptional. The amount of injury to the hay crop likely to result from the Swift and Ware diversion was not proven,—probably is not capable of proof—and was left to conjecture. How much hay land would fail to be submerged because of the diversion is quite uncertain."
>
> (Report of Special Master, p. 20.)

This finding was contrary to the weight of evidence given by the farmers who had testified to the fact that the hay had been grown without fertilization for many years because of these flood waters; that they would not own the property but for its location and the flood benefits which it received; that they had bought their land with this in view; and that, in some instances, they specified the number of acres which would not be flooded in the event that this taking was permitted.

(Joint Summary of Evidence

William H. Carrier ..... page 58
Edward A. Isaacson ..... " 60
Stancliff Hale ..... " 63
Lewis W. Howe ..... " 65
Alfred W. Hanmer ..... " 66
Raymond A. Hardin ..... " 67
William R. Dunham ..... " 68
George A. Hollister ..... " 69
Charles E. Goodrich ..... " 70
William W. Adams ..... " 71
Andrew Christiansen ..... " 73
Harold M. Newberry ..... " 74
Stipulation ..... " 75
Dr. Mont Francis Morgan ..... " 76)

For these reasons we object in Exception 51 to the findings of the Special Master.

The Special Master should not have held that it was incumbent on the Complainant to show the money value of the amount of damages to this land. It was sufficient that Connecticut proved that the action of Massachusetts would cause material damage. It was just such an invasion of rights as the taking, from these farmers, of the benefits of flood waters, which the courts have uniformly held both in Connecticut and in Massachusetts is entitled to relief in a court of equity.

Water Commissions *v.* Perry, 69 Conn., 461.
Wellington *v.* Rawson, 231 Mass., 189.

The question of the degree of actual damage which will be caused by the diversion has no application in such a case. The injury has been proved to exist; it should be corrected; and the question of damage or the amount of damage is not material. This case comes within the rule stated by this Court in *Georgia v. Tennessee Copper Co.*, 206 U. S., 230, 237:

> "It is not lightly to be required to give up *quasi*-sovereign rights for pay; and *apart from the difficulty of valuing such rights in money*, if that be its choice, it may insist that an infraction of them shall be stopped." (Italics ours.)

The Right of Landowner is a Property Right

As set forth in Exception 52, the Special Master failed to hold that the rights of the riparian owners to these flood waters are property rights protected by the constitutions both of the State of Connecticut and of the United States. The use of flowing waters exists solely because it is an incident to the ownership of real estate along the banks of the stream and constitutes a vested property right.

> Hollister *v.* Union Co., 9 Conn., 435, 443.
> Johnson *v.* Jordan, 43 Mass., 234, 239.
> Carey *v.* Daniels, 46 Mass., 236, 238.

This right to the use of waters of a flowing stream must be interpreted as applicable to all of the water which nature has supplied to the stream, and therefore includes the flood waters. It is not limited to the amount of water which flows in the stream in any one season of the year or any one year or an average of a number of years. Whether it be during periods of low flow or periods of high flow or of intermediate flow, a riparian owner is entitled to use of all of the water. The use of the flood waters for the irrigation and fertilization of the soil is an accepted riparian use. In Connecticut flood

waters occupy in its judicial decisions a class by themselves; and the Supreme Court of Connecticut has specifically said that a riparian owner is entitled to these flood waters to the same extent to which he is entitled to the use of any other flows of the stream.

Thompson *v.* New Haven Water Co., 86 Conn., 597.

It was claimed in this case that the acts of the plaintiff were *damnum absque injuria*. The Court said, page 608:

> "We thus have a situation in which the plaintiff was damaged *in his property* by an act of the defendant in interfering with the natural flow of the flood water, which had no justification in the *improvement, use, enjoyment*, or *protection of its land*. Damage done under such circumstances, cannot, *with due regard for property rights*, be regarded as *absque injuria*. (Italics are ours.)

In Massachusetts, while this distinction is not so marked, the courts have held that the flow of the stream to which riparian owners are entitled includes all of the waters flowing by nature, including the flood waters.

Nemasket Mills *v.* Taunton, 166 Mass., 540, 544.

Must be Legislative Act to take this Property Right.

The only way that these property rights can be acquired is by proper legislative act authorizing the exercise of the power of eminent domain. There has been no legislative action by any competent sovereign authorizing the taking of these rights in Connecticut, and until such action has been taken the only relief is by injunction. The Special Master should have held that these property rights cannot be taken from their owners in Connecticut by a legislative act of the Commonwealth of Massachusetts without the consent of the legislature of the

State of Connecticut, because the legislative authority of the Commonwealth of Massachusetts cannot be extended beyond its boundaries for the acquisition of property in another state, either for a public or a private purpose.

In Exception 53 we object to the failure of the Master to recognize that the use of the waters of the Connecticut River which have always been in actual and beneficial use by Connecticut citizens is a property right which can only be taken from the owners by some competent legislative body. The Great and General Court of the Commonwealth of Massachusetts is not such a body.

IX. POLLUTION

Scope of investigations

Dr. Charles E. A. Winslow and Dr. Willem Rudolfs co-operated in conducting an exhaustive analysis of the Connecticut River during the period from July 8 to September 14, 1929, and from June 17 to November 18, 1928, the purpose of which was to obtain a study of the conditions existing in the river, both from a bacteriological point of view and also with reference to the dissolved oxygen content of the stream. The quantity of domestic sewage and industrial waste which can be assimilated safely by any stream is in direct proportion to the percentage of the dissolved oxygen in that stream.

In connection with this survey there were established sixteen sampling stations on the river, located at points from the Massachusetts-Connecticut state line to the Saybrook Bridge at the mouth of the river; samples were collected and analyzed during these periods in 1928 and 1929. Some idea of the comprehensive character of these activities may be gleaned from the general summary of them.

During the 1928 period samples were taken from the river at two of these stations every hour and a half for several days, night and day. Curves were plotted based upon the results obtained from these analyses to determine which hour of the day or night the river would ordinarily indicate the average conditions. For the remainder of the period, samples were taken from two stations on the river every day at the hours (varying from eight to twelve in the morning) indicated as representing average conditions.

During the 1929 period a similar survey was made for ten days, a sample being taken from the stream every hour and a half. It was found then that average conditions would be obtained from samples collected at 8 o'clock in the morning (Rudolfs Joint Summary of Evidence, p. 1161), and samples were taken every day during the period.

The general purpose of the investigation from the public health standpoint was (Winslow, Joint Summary of Evidence, p. 86) "to determine the character of the water at the Massachusetts-Connecticut state line, to see how polluted it was, with a view of determining a possible effect thereon of alterations in the flow of the stream." Professor Winslow said that "as far as these bacterial counts are concerned, his results would indicate whether the water was suitable for bathing and whether it was suitable for drinking, either as it stands or with subsequent treatment."

Dr. Rudolfs testified that his investigations comprised mainly three tests significant of the pollution characteristics of the stream (Joint Summary of Evidence, p. 97), namely, dissolved oxygen, biochemical oxygen demand, and bacteriological examinations. He testified that in addition, "more complete chemical tests of the water were made at less frequent intervals; that two forms of pollution were considered, one coming from human beings, domestic sewage, and the other

pollution coming from industries, industrial waste: that the investigation included domestic sewage, industrial sewage and sludge deposits in the stream."

In order to insure obtaining average conditions across the stream, Dr. Rudolfs testified (Joint Summary of Evidence, p. 98) that "three samples across the river at mid-depth" were collected. He went on "if but one sample was taken, say in the middle of the stream, the velocity and the volume of water might be different from the places nearer to the banks," consequently samples were taken of the water at points in the cross-section of the river "so that there were three samples across the stream and all taken at mid depth . . . . the samples were taken at mid depth because if they were taken near the surface the conditions might be a little better than the average due to re-aeration conditions; that if they were taken close to the bottom the results would be a little worse because there might be a sludge deposit and the oxygen demand might be greater than the average of the stream."

Present condition of river at Connecticut-Massachusetts state line

Dr. C-E. A. Winslow, who has been quoted extensively by the defendants and by the Special Master, questioned as to the ability of detecting by laboratory analysis the precise effect of the proposed diversions upon the Connecticut River, testified as to the present conditions as follows (Joint Summary of Evidence, p. 92):

> "A. Yes, I think the Connecticut River at state line in the autumn of a fairly average year is what I call on the border line of nuisance."

This portion of Dr. Winslow's testimony was omitted from portions quoted by defendants and by the Special Master.

This conclusion was reached from a study of the analyses made from samples taken from the river at the Connecticut-Massachusetts state line during 1928 and 1929. These analyses disclosed *actual present conditions* before any water has been removed.

He testified (Joint Summary of Evidence, p. 88) that in 1928, the flows remained throughout pretty high; that it was one of the wettest summers in history in the twenty-four years during which there is a record, and his impression was that it was somewhere between 50 and 60 per cent above the average; but in 1929, which was the year when the stream flow was very slightly below the average, there was a different picture. While the average for the period investigated during 1929 showed only 54% saturation, in seventy-nine different instances there were individual cases of saturation below 50%. On July 27 there was a value of 28% registered; on August 13, a value of 26%; September 4, values of 28%, and 27%; and on September 10, 16% and 18%.

Dr. Winslow states (Joint Summary of Evidence, p. 89), that the really significant results of the sampling are shown in Exhibit C-18 compiled by Dr. Rudolfs because it shows the result by days. He thinks in a case of this kind averages are likely to mislead a little because if a nuisance is created through a certain week or month, even if general averages are good, it is a real fact. The crucial time is in the fall when the river flow is low and at that time as Exhibit C-18 indicates, in 1929, in the first ten days of September the oxygen was so low as to be oscillating back and forth pretty close to the demand for oxygen; in other words, during that ten days the stream was in a border line condition in which any substantial removal of oxygen or water containing oxygen would have thrown it completely over the line and that was the time when these results of 16, 18, 24, and 26 per cent saturation were obtained.

His experience has indicated that if the condition is as close to the line as that, that at certain points of slow flow and shallow water and sludge, there is likely to be a serious nuisance; that is why he feels justified in saying that a dissolved oxygen content much below 50% saturation indicates rather a "ticklish situation" and certainly any substantial removal of oxygen above that present would, during a period such as this, have pushed over the line, exhausted the oxygen completely and produced a real nuisance.

Dr. Rudolfs, another expert witness for Connecticut, who compiled the Exhibit C-18, which Dr. Winslow discussed, testified (Joint Summary of Evidence, p. 100) that during the period July 8th to September 14th, 1929, the percentage of oxygen saturation was from 20 to 29% upon one day; eight days from 30 to 39%; sixteen days from 40 to 49%; twenty days from 70 to 79%; and one day from 80 to 89%; that the average for the whole period was 54% saturation; that the number of days the saturation was below 50% was as follows: Out of sixty-nine sampling days 25 times or 36% the saturation was below 50% or a little over one-third of the time; that he found from these studies (Joint Summary of Evidence, p. 108), that at the present time the water at the state line is just on the border line.

The Special Master erred and mistook the law in failing to find that Massachusetts has no right to pollute the waters of an interstate stream to such an extent that they are delivered to the State of Connecticut at the state line in such condition as to be unsafe for bathing and so near the border line that any appreciable diversion therefrom will make the stream become a nuisance, and that so long as the stream remains in such polluted state water can not be diverted from it by the state responsible for the polluted and dangerous condition. (Exception 56.)

During this period in 1929 the average flow of the Connecticut River at the Connecticut-Massachusetts state line was 5,050 cubic feet per second (Joint Summary of Evidence, p. 106) which is substantially equivalent to a height of 2 feet on the Hartford gauge (Exhibit C-25-a).

As will be observed, the Connecticut testimony concerning conditions as they are actually at present is based upon actual observations taken each day, while all the Massachusetts testimony was based on monthly averages. (Weston, Joint Summary of Evidence, p. 128, Exhibit D-8, Exhibit D-9.)

The misleading results which may be obtained from the use of monthly averages particularly as compared with daily results has already been commented upon in referring to Dr. Winslow's testimony.

Slight decrease of oxygen will tend to create nuisances

We have just discussed, in reviewing the testimony of Dr. Winslow and Dr. Rudolfs, the critical condition which actually exists a substantial portion of an average year when the flow of the stream approximates an equivalent of 2 feet on the Hartford gauge, also that at such a time any substantial reduction in the flow of the stream will have undesirable results and will create an actual nuisance.

Dr. Rudolfs stated (Joint Summary of Evidence, p. 102), that odor nuisances begin to occur if the oxygen content is nearing exhaustion even if there are no sludge banks present. He also states that where there are sludge deposit beds, these deposits will come above the water line when there is very low water and are susceptible to decomposition. Naturally under such conditions the bacteria present in the sludge beds continue to work and all kinds of foul odors occur. (Joint Summary of Evidence, p. 97.) This working of sludge beds

and production of odors are accompanied by ebullition of gas rising from the sludge beds, indicating active decomposition and putrefaction. He further states that during the period when they were making surveys to determine the existence of sludge beds in the river, they found that there were sludge banks partly exposed on days of low water. (Joint Summary of Evidence, p. 108.)

Sludge beds

Dr. Rudolfs testified (Joint Summary of Evidence, p. 97), that his investigation had included the existence of sludge beds in the Connecticut River. Sludge deposits are composed of human and industrial wastes which are heavier than water and when the velocity of the stream is insufficient, these settle out forming first in quiet places and around bends as slight deposits which accumulate later on; that the first deposits usually occur below sewage outlets. If there is very low water, the sludge deposits will be uncovered and come above the water line causing odor and nuisances. These sludge beds take out a large volume of oxygen which would otherwise be available to meet the demand of the soluble sewage in the stream.

His survey disclosed the fact that the sludge deposit at the state line in October 1929 was about 310,000 square feet with the average of about 1.4 feet in depth, or a volume of 435,000 cubic feet; that the volatile solids amounted to about 1,000,000 pounds with a biochemical oxygen demand of 108,400 pounds with a population equivalent of 500,000 to be satisfied from the water in the river.

In 1929 he made two surveys to determine the existence and extent of these sludge deposits, one in the spring and one in the fall. He found that there was a substantial increase

in the size of these deposits during this period. For instance, using the sludge beds at Springfield at the lower bridge as an illustration, the area in early summer, in June, was 104,900 square feet and in the fall 178,000 square feet. The biochemical demand in the summer was 54,950 pounds and in the fall was 64,950 pounds. These figures indicate an accumulation of sludge deposited in that vicinity with a definite increase in oxygen demand during the summer months from June until the beginning of October. (Joint Summary of Evidence, p. 107-108.)

He testified (Joint Summary of Evidence, p. 120) as to the effect of the velocity of the stream flow upon sludge deposits. If the velocity of the stream is not sufficient sludge beds will grow; and they are most apt to grow at the time of year when the flow is less; they are most apt to disintegrate to some extent if the velocity of the water increases materially which would probably be in the spring when there is a high water.

Mr. Robert Spurr Weston, an expert witness for Massachusetts, while suggesting that the sludge beds depositing on the bottom in the summer months and staying there are possibly of a little benefit in retarding the amount of demand which might be created lower down, concedes the fact that when the stream flow is higher some of the sludge beds go down stream. (Joint Summary of Evidence, p. 129.)

Bathing

Dr. Winslow testified that the standards of water for bathing established by different observers and different State Commissions vary from 4 to 30 colon bacilli per cubic centimeter, and numbers of B. coli in the Connecticut River is many

times greater than even the highest of these standards and is distinctly unsafe for bathing. (Joint Summary of Evidence, p. 89.)

Dr. Rudolfs testified that in regard to bathing the river is polluted and is dangerous. (Joint Summary of Evidence, p. 108.)

Water supply

Dr. Winslow stated that obviously the Connecticut River is not suitable for drinking without treatment, but that it would be possible to purify the Connecticut River water for drinking purposes providing storage, filtration and chlorination were provided but that it is beyond the limits generally considered safe for treatment by filtration and chlorination alone. (Joint Summary of Evidence, p. 87.)

Dr. Rudolfs agreed that at the present time it would need considerable treatment before the water could be used as a water supply but that it could be used by treating it. (Joint Summary of Evidence, p. 108.)

In this connection the testimony of Gen. Sanford H. Wadhams, Director and Commissioner of the State Water Commission of Connecticut, is important. General Wadhams stated that his Commission had been charged by law with the duty of making a survey of the water resources of the State of Connecticut. He stated that up to the present time that this work had been substantially accomplished and that this Commission was satisfied that with the limited sources of supply now existing in the State of Connecticut for future development it was inevitable that the streams of the State must be purified so that they might be available for domestic supply by some of the cities in the State.

With regard to Hartford in particular the General stated that the last session of the General Assembly of Connecticut created a Metropolitan District at Hartford consisting of that city and five other adjoining towns all united in the supply of essential public utilities such as, water, sewage disposal and a few others; that the same General Assembly refused the request of the City of Hartford to take a water supply from a source other than those now in use and that he thinks that Hartford will be the first city that will have to consider using the Connecticut River as a water supply. (Joint Summary of Evidence, p. 146.)

Connecticut River as compared to other streams

Dr. Winslow prepared data concerning the analyses throughout the country of various streams which were in actual use or proposed to be used for public water supplies, comparing the condition of these streams with that of the Connecticut. In almost all of the figures other than those for the Connecticut River the total colon group is included. If the true B. coli only had been determined the results would have been lower and the bacterial content of the Connecticut so much higher by comparison. Had there been included all of the bacterium coli count which is usually used in the study of water supply, the results on the Connecticut River would have been higher; these results are given both for colon bacilli per cubic centimeter in one column and colon bacilli per 100 cubic centimeter in the second column; the reason for this is because Massachusetts Board of Public Health use the latter in reporting analyses of its streams, including the Merrimac River at Lawrence.

(Page 95, Joint Summary of Evidence)

	Colon bacilli per cubic centimeter	*Colon bacilli per 100 cubic centimeter*
Mississippi, above Minneapolis ..	13	1,300
Maumee, at Toledo	20	2,000
Allegheny, at Pittsburgh	21	2,100
Ohio, at Louisville	22	2,200
Grand, at Grand Rapids	26	2,600
Delaware, at Trenton	29	2,900
Ohio, at Cincinnati	30	3,000
Mississippi, at St. Louis	31	3,100
Maiden Creek, at Reading	42	4,200
Merrimac, at Lawrence	42	4,200
Mahoning, at Youngstown	54	5,400
Schuylkill, at Philadelphia	59	5,900
*Connecticut, above Hartford** ..	*68*	*6,800*
Missouri, at Kansas City	159	15,900
Hudson, at Albany	194	19,400
White River at Indianapolis	225	22,500
Connecticut, at the State Line ...	*378*	*37,800*

Population capacity

The population capacity of a stream affords a convenient way of measuring the effect of water diverted from or added to the flow. Witnesses testified that it would be impossible to detect, by the ordinary means afforded by laboratory analysis, the effect on the chemical and bacteriological characteristics of the stream of the diversions proposed by Massachusetts, yet this effect may be estimated and expressed in terms of population capacity.

Defendants offered Exhibit D-14 entitled "Summary of Computations from Analytical Data Showing Population Capacity of Connecticut River at State Line, *and Estimated Effect of*

* The Connecticut above Hartford is the best point in the river.

Swift and Ware River Diversions and Releases, as Authorized by the Massachusetts Legislation and as Modified and Restricted by the War Department Regulations." (Italics ours.)

Earl B. Phelps, an expert witness for Massachusetts, testified (Joint Summary of Evidence, p. 130):

> "That the population capacity of the stream is its oxygen balance expressed in terms of population; that Dr. Rudolfs has told how it is possible to evaluate the sewage and other wastes of a given population in terms of oxygen and he has made use of that principle to express his industrial wastes in terms of equivalent population; that it is found convenient to carry this process one stage further and to express the oxygen equivalents determined by analysis of the waters likewise in terms of population; . . . . . that population capacity of the stream, therefore, is its ability to provide for the wastes of a given population during the time of passage to salt water and under the temperature conditions existing . . . . . it represents in brief the reserve capacity of the stream to care for additional pollution over and above that which it now contains and to carry that pollution to the sea without the production of a resulting nuisance."

Robert Spurr Weston, an expert witness for Massachusetts, testified (Joint Summary of Evidence, p. 124):

> "Population capacity means the capacity which a stream has of oxidizing the pollution produced by population in terms of the number of population; for example, the population capacity of 1,000 means the ability of the stream to care for the sewage produced by 1,000 people or the industrial waste equivalent to 1,000 people."

Exhibit D-14 shows the population capacity of the Connecticut River at the State Line expressed in terms of monthly

averages. Some days would be higher than the average and some lower. As a corollary, some weeks would be higher than the monthly average and some lower.

The population capacity of the stream by definition presupposes that when this capacity is reached, by the imposition of a certain population equivalent on the stream, that there is no oxygen left. In other words, Exhibit D-14 shows that for the month of August, 1929, the population capacity of the Connecticut River at the State Line was only 368,000 persons. By definition, if the pollution load from a population of 368,000 had been imposed upon the stream during that month it would have exhausted all the available oxygen and the stream would have reverted to an open sewer.

Exhibit D-14 shows that for the three months, namely, July, August and September, 1929, the population capacity of the Connecticut River at the State Line was as follows:

July	649,000
August	368,000
September	416,000

The present population equivalent load on the Connecticut River at the State Line is 619,000 (Rudolfs, Joint Summary of Evidence, p. 105).

Exhibit D-14 shows in column five that the percentage change in flow, by reason of diversion or release as proposed by Massachusetts, varies from an addition of .9% in August, 1929, to a subtraction of 2.8% in March, 1929. Within the range of these small percentages of additions or subtractions from flow, the population capacity of the stream can be affected by as much as 2,410,000 persons. This means that even

though the diversion be a relatively small percentage of the total flow of the river, the effect, when expressed in terms of population capacity, can be substantial.

Exhibit D-14 shows that in 1929, during the months of July and November, months in which low flows of the river commonly occur, the effect of the diversions, even as restricted by the War Department regulations, is a subtraction from the population capacity of the stream. The population capacity is also an indication of the border line situation which exists with respect to nuisance conditions. The same stream which has a population capacity of 144,760,000 in the month of April, 1929, is reduced by conditions of temperature and low flows to a figure of 368,000 in August. It has proceeded far toward the depletion of its oxygen reserves.

Robert Spurr Weston testified (Joint Summary of Evidence, p. 128):

> "That it would be possible to give it (the Connecticut River) more carrying capacity in the summer than it now has, by as much as 100 percent."

Dr. Charles-E. A. Winslow testified (Joint Summary of Evidence, p. 89):

> "That it is perfectly true that if there is any oxygen present in a given volume of water at a given moment there will not be any nuisance unless there is a sludge bank underneath it; but that his experience indicates that if the condition is as close to the line as that, that at certain points of slow flow and shallow water and sludge there is likely to be a serious nuisance, that is why he feels justified in saying that a dissolved oxygen content much below 50 per cent saturation indicates rather a ticklish situation and certainly any substantial removal of oxygen above that present would, during a

period such as this, have pushed the thing over the line, exhausted the oxygen completely and produced a real nuisance."

Sources of pollution

Dr. Rudolfs testified that a survey had been made of the Connecticut River, extending into Massachusetts, Vermont, and New Hampshire, to determine the quantity of domestic sewage and industrial wastes contributed to the river above the Connecticut-Massachusetts state line; he found that very little industrial waste comes from New Hampshire and Vermont and that by the time it reaches the state line it is all oxidized; the bulk of the sewage and waste is discharged into the Connecticut River by the towns of Holyoke, Chicopee and Springfield, with a considerable quantity coming from the Chicopee River which is a tributary coming in just above Springfield, all of which is within the Commonwealth of Massachusetts. (Joint Summary of Evidence, pgs. 105 and 106.) Dr. Winslow found that the sewage from the city of Springfield is the principal and immediate source of pollution, finding its way along down the east bank of the river. The results are that in their work they "always found that the worst condition was at the east side of the river and then the middle and then the west bank; the same thing would be true with reference to the sewage of other cities discharging sewage into the stream." (Joint Summary of Evidence, pgs. 88 and 89.)

Improvement between Connecticut-Massachusetts state line and Hartford

It appears from the testimony of Dr. Winslow (Joint Summary of Evidence, pgs. 94 and 95), that the Connecticut River just above Hartford is the best point in the river from a bacteriological standpoint; the reason for this is explained by the fact that the water improves very rapidly immediately below the state line, resulting from storage in the pool back

of the dam at Thompsonville, and aeration where the water flows over the rapids just below the dam. Dr. Rudolfs testified that there is a dam about 6 to 7 feet high at Enfield and below the dam there is a stretch of about a mile and a half of ripples over which the water at low flow is reaerated very vigorously (Joint Summary of Evidence, page 115). Dr. Winslow testified that were it not for this condition at the Enfield dam, the conditions at Hartford would be very much more serious than they are at present. Dr. Rudolfs testified (Joint Summary of Evidence, p. 115) that with the construction of the proposed new dam at King's Island, while it will continue the pondage, it will remove entirely the benefit derived from the mile and a half of ripples or rapids now existing below the dam because they will be covered.

Effect of the diversions

a. *War Department restrictions do not necessarily affect pollution*

If it is to be considered that the restrictions imposed by the War Department are of any benefit so far as the sanitary condition of the Connecticut River is concerned, it must be remembered that these restrictions are not invoked for the purpose of making the Connecticut River more sanitary, but for the sole purpose of protecting its present navigability. If these improvements are to be considered as material, their permanency will depend entirely upon whether or not the War Department may see fit to continue its present ruling. This is not guaranteed, in fact the War Department specifically states that whatever it has decreed is subject to further order, after the consideration of additional data. If Massachusetts wishes to take the position that it intends to improve the condition at the Connecticut-Massachusetts State line, even though slightly, by the release of water in excess of the natural low of the stream during low flow, this benefit should not be made to depend upon what the War Department does

for the purpose of navigation; this benefit should be provided for by modification of the Massachusetts legislation or else in a decree of this Court.

b. *During high flow*

It has already been stated elsewhere that when the Hartford gauge stands at flood stage, there will be an average reduction in height of water of between three and five inches; at times the reduction will go as high as 6½ inches. There will always be a diversion, in varying amounts, whenever the Hartford gauge is in excess of 2.1 feet; the periods when the spring freshets are of most benefit to the river in disintegrating and removing the sludge beds as suggested by Dr. Rudolfs and Mr. Weston, will always be depleted by these diversions and to that extent will have an adverse effect on the sanitary condition of the stream.

c. *During low flow*

As Dr. Winslow and Dr. Rudolfs have testified, the actual condition of the river during the time of low flow in an average year is on the border line where removal of water from the river will cause nuisance.

Much has been made of Dr. Winslow's testimony by the Special Master, where he appears to have taken the position that a 2% diversion of the flow of the Connecticut River will have no appreciable effect on the condition of the stream. In the first place, Dr. Winslow did not pretend to be an hydraulic engineer and his assumptions are based upon the fact that during the period of low flow, particularly when the gauge height at Hartford is approximately 2 feet, that there will always be some contribution from Massachusetts over and above the condition of the stream that would naturally flow; what Dr. Winslow did say was that this 2 per cent would prob-

ably not be susceptible of precise determination by laboratory analysis which is somewhat different from saying that the reduction of 2 per cent of the flow will have no effect on the stream, whether it can be mathematically disclosed from an analysis or not. Dr. Rudolfs stated that from a chemical standpoint any amount of oxygen added to or taken from the water of streams would add to or detract from the quality of the water and cited as an example that the diversion of 150 cubic feet per second would be equal to the reduction in population capacity of 37,000 people and that each cubic foot per second taken out or added would make a corresponding decrease or increase of the population capacity of the stream of 1/150th of 37,000 people or approximately 240 people. In view of the fact that much has been made of the idea that up to at least 5% and possibly 10% of the flow of the stream is needed to change the sanitary conditions during periods of low flow, it might be claimed that the suggestions of the War Department are practically of small moment, so far as compensating Connecticut is concerned, for what is essentially a continuous abstraction of the water from the river during the whole year. It is worthy of consideration that if Massachusetts desires to compensate for this continual diversion of water from the river, the least it could offer would be an amount of release which even they could claim to be of sufficient quantity to be analytically determinable as a benefit to the quality of the stream.

There will be actual diversion during low flow

As already shown (Navigation Supra, page 87), the Special Master has proceded upon the assumption that during periods of low flow there will *always* be an addition to the natural flow of the stream by release from the Swift River dam, due to the restrictions of the War Department, and that during this time there would be no diversions. This assumption is not

correct; Exhibits C-41 and D-36 show that during more than 40 per cent of the time when the Hartford gauge is at 2 feet (mean low water) or below, actual diversions will take place even under the restrictions of the War Department. (Exception 54.)

During the period testified to by Dr. Winslow in 1929, when he found the stream to be upon the border line as a general thing, and on many specific instances found that it was below the danger line, and when Dr. Rudolfs found upon his investigations for sludge beds that these were actually exposed at certain times during the period, the average flow of the stream averaged 5,050 cubic feet per second or 2 feet on the Hartford gauge. Thus when even now the water is not adequate to properly safeguard the stream from becoming a nuisance, there would actually be diversions from the water naturally flowing.

Future effects of the diversion

Dr. Winslow testified that assuming the normal growth of population and industry between the state line and Holyoke, there will be an increased demand upon the water for oxygen during the next 10 years; that the more sewage and industrial wastes put into the river, the more oxygen is needed to take care of it (Joint Summary of Evidence, page 91); he also stated that this danger can practically be eliminated if the Massachusetts cities along the river adopt sewage disposal plants to take care of this pollution (Joint Summary of Evidence, pages 97 and 96). However, it is to be remembered that under the statutes of Massachusetts, the Connecticut River is exempt from the jurisdiction of the Board of Public Health and the Special Master advises that there is no indication that the policy of Massachusetts in permitting its streams to remain polluted will change. Dr. Rudolfs has graphically set forth the future condition of the Connecticut River up to and including the year 1970, without diversions (page 106, Joint Summary of Evidence).

Year	*Equivalent Population*	*% D. O. Saturation*	*D. O. P. P. M.*
1929	750,000	56	4.9
1940	900,000	50	4.4
1950	1,080,000	45	3.96
1960	1,290,000	41	3.61
1970	1,540,000	37	3.26

Water policy of Connecticut as to pollution

In Exception 55th to the Special Master's Report, it is claimed that the Master erred in finding, with respect to the policy of the State of Connecticut as to the preservation of the purity of its water sources, that it was not different from that of Massachusetts.

The Master failed to take cognizance of present conditions and the present practice of the State of Connecticut as testified to by Brigadier-General Sanford H. Wadhams, Director and member of the State Water Commission.

General Wadhams testified that the State of Connecticut, through the State Water Commission, is embarked on a program aiming to correct and prevent the pollution of the streams of the State.

He testified that the State Water Commission was created by "Chapter 143 of the Public Acts of 1925, entitled 'An Act Concerning the Pollution of Water and creating a State Water Commission.'" He testified that under the law his Commission is charged with the elimination of the pollution of the waterways of the State, under very broad authority. The Act prohibits any new sources of pollution which might come into existence after the passage of the Act.

He pointed out that the functions of the State Water Commission and their interest in matters concerning pollution

were based fundamentally on the economic aspects of the problem in contrast to the interest in the same problems of the State Department of Health, which is concerned primarily with conditions menacing the public health.

He testified that the reason for the Commission's existence is that even prior to the time the Commission was created "industry was becoming hampered for the want of the necessary water of the proper quality and sufficient quantity; that in other words, the economic development of the State of Connecticut was approaching the saturation point," because of the limitation of water resources.

He said that the population of the State of Connecticut was increasing and "the population curve shows a steady year by year rise; — that all over the State of Connecticut practically every city of any size in the State is at the present time reaching out in an effort to develop additional sources of water." He said that engineers declare that all of the available clean water resources of the State are already developed. In consequence of the imminence of the water conservation problem, the State Water Commission has taken up with officials of the communities throughout the State the necessity of formulating a program for treating their sewage before it is discharged into the waterways of the State.

The State Water Commission has been successful in its efforts and "it may be said almost without reservation that every community of any considerable size in the State of Connecticut is engaged at the present time in some stage of the process" of formulating a program for the treatment of its sewage.

The City of Hartford has adopted a program which commits it to an expenditure in excess of $3,000,000.

The program of the State Water Commission contemplates that every community now discharging sewage into the river will be required to treat that sewage.

The State Water Commission is further engaged in making a comprehensive survey of the water resources of the State of Connecticut.

The Commission has a vital interest in the proposed diversion of the Ware and Swift Rivers because it is not only Massachusetts that proposes diversions from Connecticut streams but other neighboring states are looking "with longing eyes" towards certain interstate streams. (Joint Summary of Evidence, p. 145.) The conservation of the water resources of the State means a cleaning up of the streams in Connecticut for the purpose of future water supplies and in the comparatively near future it will be necessary for cities and towns in Connecticut to go to the larger streams, interstate streams such as the Farmington, Connecticut, and Quinebaug Rivers as sources of domestic water supply. If the State of Connecticut continues to grow and develop, the likelihood of the use of these large rivers for water supply will become an assured fact. Hartford will be the first city that will have to consider using the Connecticut River. (Joint Summary of Evidence, p. 146.)

The testimony of General Wadhams shows that Connecticut has a forward-looking policy of conservation of water resources involving modern scientific means for the preservation of their purity, that the cities of Connecticut are preparing for the use of their large rivers for water supply purposes.

In view of this undisputed testimony the Special Master erred in finding that Connecticut's practice with respect to pollution of rivers is not different from that of other New England States. The policy of Connecticut is distinctly

opposed to that of New Hampshire, for example, where the rivers are used as drainage arteries as a matter of well-understood policy. It is different from Massachusetts, where the large rivers, the Merrimac and Connecticut, are exempted from the jurisdiction of the Board of Health. In Connecticut no stream is exempt from the regulation and conservation of the State Water Commission. Not only does Connecticut not accept the Massachusetts point of view that the Connecticut River is to receive the raw sewage of the cities along its banks but it has definitely served notice on Connecticut cities now polluting the river that each must take steps to terminate such pollution.

The sharp contrast in the attitude of the two states is all the more to be remarked when the fact that there is no state below Connecticut on the Connecticut River watershed whose interests require safeguarding. The Special Master should have found that for the last five years Connecticut has had a policy aiming to prevent pollution of its streams.

X. FISH LIFE.

Connecticut is engaged in a program of the propagation of fish

The use of the Connecticut Rvier for fishing has been enjoyed since earliest times. This use has been officially recognized by the State, which through its State Board of Fisheries and Game, licenses and regulates fishing, and is engaged in the operation of hatcheries for the propagation of fish. Records were introduced showing the shad catch, and fry release, for example, running back for a period of almost fifty years. (Ex. D-12.) The activities of the State Board of Fisheries and Game are set forth in detail in the testimony of its Superintendent, Mr. John W. Titcomb (Joint Summary of Evidence, pp. 151 and 152). He showed that the State operates two shad hatcheries and a perch hatchery on the Farming-

ton and Salmon Rivers which are tributaries of the Connecticut. He showed that the fry release of shad into the Connecticut River has been steadily increasing since 1923 until it amounted to almost 19,000,000 in the year 1929.

Connecticut River now on border line for fish life to survive

A careful examination was made of the condition of the water in the Connecticut River. These analyses showed that the amount of oxygen in the river is barely sufficient to support fish life and that there were a number of days when the river was so polluted at the state line that fish like shad must either migrate or die. (Rudolfs, Joint Summary of Evidence, p. 155.) This condition continues throughout the summer. Figures as to oxygen conditions at Hartford indicate that conditions there are just above the border line at the time of average summer dry weather flows. (Joint Summary of Evidence, p. 156.)

Fish life affected by reduction of low flow

Scientific knowledge has not advanced to the point where it can be stated with precision just exactly what the effect is on fish life of variations in the conditions under which the fish live. This holds even for slight changes. Mr. Titcomb explained this limitation of knowledge and basing his conclusions on his vast experience in connection with the study and propagation of fish, particularly shad, he gave as his very strong opinion that any change, as by taking out clear water of the tributaries, will adversely affect the run of fish and their natural reproduction in low water. Even as small an amount as 2% of the fresh water might change the temperature and other conditions in the stream so that they would adversely affect fish life. He admits that no human being can tell just what all these differences are, but he testified that the diversion would take out of the river the clear waters of a pure stream

which has the even temperature which fish like, every drop of which will affect the river. (Joint Summary of Evidence, p. 153.)

Diversions will be made during low flows

The testimony (Joint Summary of Evidence, p. 156) purports to show that due to the restrictions of the War Department, at times there would have been water released from the Swift River Reservoir increasing the flow of the Connecticut River 1½% and thus effecting an improvement in its quality. This is based upon the false assumption that on each day when there was extreme low water in the Connecticut River, there would be no diversions from the Ware and Swift Rivers but water would be released from storage on the Swift River. However, as shown in Exhibit D-36, this was incorrect, because on 40% of the days when the water in the river is low, there would be diversions from the Ware and Swift Rivers instead of releases from storage, and these facts were not on the record at the time Dr. Rudolfs testified on this subject. (Joint Summary of Evidence, p. 156.) His testimony at this point is his conditional opinion given in response to a question that was not founded on fact.

Fish life also dependent upon spring freshets

While it is true that oxygen in the water is essential for fish life, and that the oxygen content is less during the time of low summer flows, yet there are other conditions which affect the propagation and continuance of fish in a stream. This is particularly true of almost all anadromous fish, such as the shad which run on the high water. Fish are affected by the temperature of the water, by the time when floods occur and by the weather conditions directly following those floods. They are affected by dams; this is particularly true of shad. So far as the fish life on the Connecticut River is concerned, the

amount of the catch has, no doubt, been materially affected by the policies and activities of the State Board of Fisheries and Game, because of regulating fishing, the issuance of licenses, and artificial propagation. These factors were summed up by the Special Master as "temperature, time of flood, artificial propagation of shad, limiting and regulating shad fishermen and the fishing industry, existence of dams and other conditions." (Report of Special Master, p. 22.) Of all the conditions which affect fish life outside of the oxygen content of the water, the only one with which we are concerned here, and which is directly affected by the proposed diversions of these tributaries, is that of the reduction of freshet flows. In our Exception 57, we take issue with the finding of the Special Master "that the lowering of flood water resulting from proposed diversions is not shown to be materially injurious to the shad run" (Report of Special Master, p. 22). This finding was contrary to the evidence, which was unanimous, so far as those experienced with fishing conditions on this river were concerned, that the flood waters were an important feature in maintaining fish life. Mr. Arthur H. Frazer, whose business has been that of a fisherman on the Connecticut River, had found from his long experience that the spring floods influenced the catch of shad in the Connecticut River. This he attributed to two causes:

> First, the cleansing or flushing effect of the floods in removing the sludge banks and accumulated pollution from the river bed.
>
> Second, the forcing of fresh water out into Long Island Sound which attracts the shad into the river.
>
> (Joint Summary of Evidence, p. 151.)

Mr. Frazer's testimony was corroborated by Mr. Beckwith who testified that as a result of the 1927 flood, twice as many shad as usual were caught in the lower end of the river. (Joint Summary of Evidence, pp. 154-155.)

The phenomenon of the relation between spring freshets and the run of shad is explained by Mr. Titcomb. He called attention to the general relationship between the May floods particularly, and the catch of fish. He explained that the catch is not directly proportional to the magnitude of the May flood because numerous other factors affect fish, but he did show that over a long period of years there was a general relationship, and explained why, in any specific year due to other factors, this relationship may not appear to exist. Graphs were presented showing in general this relationship. (Ex. C-29 and C-29 a.)

Defendant offered no evidence at all on this subject. They did, however, present Mr. Robert Spurr Weston, whose qualifications as an expert (Appendix Joint Summary of Evidence, pp. xviii et seq.) include water purification, water supply, and stream pollution, but no studies of the habitat or propagation of anadromous fish, or any other species. His testimony on this subject (Joint Summary of Evidence, pp. 156, 157) is that he thought the effect of the diversion would be immaterial so far as fish life was concerned.

The Chief Engineer of the Metropolitan District Water Supply Commission, Dr. Winsor, who did not profess expert knowledge of fish life, presented a diagram (Ex. D-12), which attempted to disprove the general relation between the May floods and the catch of shad by a special arrangement of flood record from 1880 to 1929. In this, he disregarded chronological order, taking and placing beside each other, years of different decades even. The year 1927 is compared with the year 1905; the year 1898 with the year 1910. By this jumbling up of the dates so as to disregard those important factors which took place over periods of time, he neglects the gradual increase in the pollution of the stream; the artificial propagation since 1923, and the release of millions of fish fry; the number of fishermen engaged, and the permits

issued under the policy of the State Board. All of these factors, which were changing materially over this period of almost fifty years, naturally aided in producing a diagram which beclouds the relationship to which Mr. Titcomb referred.

Diversions will be substantial during freshet time

During these periods of high water, when the quantity of flow is so essential for flushing out the stream and pushing fresh water out into the Sound, the effect of these diversions will be most intensely evident upon the height of water in the Connecticut River, the reduction in flood heights being from 3 to 5 inches with a maximum of about 6½ inches. (Joint Summary of Evidence, p. 29 and Exhibit C-6-A.)

Shad merely an indication as to fish life in general

While practically all of the evidence is confined to shad, because of its particular importance on the Connecticut River, shad was taken by the witnesses merely as an indicator of the needs of fish life in general. While it is true that there are certain kinds of fish, such as carp, eel and catfish which can exist in waters with less oxygen than the amount required by other forms of fish life such as bass, pickerel and trout, yet because of the preponderance of shad in the Connecticut River, it is reasonable to use this fish as an indicator or index of the requirements of fish in this stream. (Joint Summary of Evidence, p. 155.)

Shad catch affected by diversions and other fish life necessarily affected

The record shows that the conditions of the river are now close to the border line (Joint Summary of Evidence, p. 156), and that fish life has a higher oxygen requirement than the amount which is sufficient to prevent nuisances. It

must necessarily follow that any diversion from the stream during low flows tending to increase pollution concentration or affect the temperature of the water, will be deleterious to fish life. Further, decreasing the intensity of the flood flows, thus reducing the cleansing capacity of the river, will disturb and reduce fish life to the detriment of the citizens of Connecticut who enjoy fishing and who earn a livelihood from this industry.

The State in its trusteeship over streams must protect them, not alone for navigation but also for fishing, and this duty has been imposed upon government since the days of *Magna Charta*. The trusteeship of the State in this connection is discussed elsewhere in this brief.

XI. MASSACHUSETTS DEFENSE

The Commonwealth of Massachusetts in its Answer filed in response to the Bill of Complaint of the State of Connecticut not only denies and puts the Complainant upon proof of certain facts alleged in the Bill of Complaint but also goes further and alleges certain affirmative allegations, first, in connection with the allegations of the Complainant substantiating its claim for relief; and second, matters which the Commonwealth claims to be reasons why the bill of the Complainant State, if proven, should not prevail.

As to the matters contained in the Complainant's bill, it is alleged by the Commonwealth of Massachusetts—

1. That the proposed diversions of water from the Ware and Swift Rivers, so far as they affect the flow of the Connecticut River, are not measurable nor determinable.

2. That no possible injury or damage will be caused to either the Complainant State or to any of its citizens because of these diversions.

3. That the diversions will be of great benefit to Connecticut and its citizens because they will reduce damage from floods.

4. That it is the intention of Massachusetts to increase the usual flow of the Connecticut River through the manner of the diversion of these streams.

5. That the waters of the Connecticut River at the present time are sufficient at all times of the year to take care of all of the pollution which Massachusetts now permits to be introduced into the stream and will not be increased or affected by the diversion of these waters.

6. That notice was given to the State of Connecticut of the intention of Massachusetts to authorize these diversions. That Connecticut was represented and heard at length concerning these diversions before the Acts were passed.

These are the allegations of fact which have been affirmatively alleged by the Commonwealth of Massachusetts in answer to the bill of Connecticut and the burden of proof is upon Masachusetts to sustain these allegations.

How well this burden has been sustained may be discovered in a short résumé of the evidence produced at the trial.

> *First*, so far as the diversions not being measurable or ascertainable, it appeared from the evidence of Dr. Winsor, Chief Engineer of the Metropolitan District Water Supply Commission that based upon weekly averages the diversions would take from the waters of the Connecticut River 2.13 per cent of the average flow under the Massachusetts legislation and 2 per cent of the average flow of the river under the restrictions of the War Department, the average flow being 17,000 cubic feet per second. These facts were admitted by the Complainant.

Second, no evidence was introduced by the Commonwealth of Massachusetts to show that no damage would be caused by these diversions. As to power, their principal witness, Mr. Weston E. Fuller, admitted that the diversions under the Massachusetts legislation would reduce the waterpower available at Windsor Locks one per cent of its productive capacity and three-quarters of one per cent under the restrictions imposed by the War Department. As to agriculture, the only witness appearing for Massachusetts, Mr. Christensen, admitted the benefit of the freshet flows of the river and that his property would be damaged by loss of these flows. Counsel for the Commonwealth entered into a stipulation that 9,500 acres of land devoted to the growing of hay would be affected by a diversion of these streams. As to navigation, no witnesses appeared for the Commonwealth of Massachusetts to refute the testimony of those who actually navigated the river.

Third, the nearest approach to an attempt to prove damage from floods was the cross-examination of Mayor Batterson of Hartford who conceded that if the city desired to use lands for other purposes rather than the purposes for which nature expected them to be used, that the city is ready and willing to protect these lands against the floods but not to interfere with the use of the flood waters by others to whom they are beneficial. No attempt was made to prove any benefits to the State of Connecticut or its citizens because of these diversions.

Fourth, as to any increase in the flow of the stream, it appeared that under the Massachusetts legislation it had picked the lowest flow, which occurs only on the average of one day a year, as the flow which it would permit to be released from the stored waters of the Swift River. The only increase of flow is that provided in the War Department findings in possible aid of navigation and which the War Department insists must be complied with by Massachusetts in order to take any water from the river.

Fifth, as to pollution, the Massachusetts witnesses claim that, based upon monthly averages and disregard-

ing actual daily conditions, the stream at the Connecticut-Massachusetts state line was able to care for the pollution entering the stream in Massachusetts, but no effort was made to show that the sanitary conditions of the stream would be improved by the Commonwealth of Massachusetts. On the other hand it was shown that by legislation the Connecticut River is exempted from control by the Massachusetts State Department of Health.

Sixth, as to any notice to Connecticut for any hearing before the passage of the Acts in question the record is silent, no evidence having been produced by Massachusetts.

The Commonwealth of Massachusetts also affirmatively alleged certain facts which it claimed to be sufficient to warrant this Court in refusing to grant the relief sought by the Complainant. This claim is based *first* upon the fact that there are no pure and unpolluted sources of water supply in the eastern part of Massachusetts from which an adequate supply can be obtained for an addition to the domestic supply of the Metropolitan District of Boston and all towns which may decide to obtain a supply of water from it. *Second*, that because of this lack of available supply that a great impressive emergency or necessity exists because if the waters of the Ware and Swift Rivers cannot be obtained there will be great distress and hardship and even sickness and disaster in the City of Boston and surrounding communities because there will be no supply of water for them to use.

It appears in the report of the Special Master, page 29, as follows—

> "In this view, I have regarded as important the allegation of Connecticut in an amendment to the bill that the Boston District as well as the neighboring population can well be supplied with good water from the eastern part of the state."

The Special Master also finds on page 51 of his report as follows—

> "Having found on the first branch of the case that Connecticut will not be substantially and seriously injured by the Ware-Swift diversion and the people of Massachusetts having made their decision in favor of the Ware and Swift, conceding that it is open to Connecticut to ask this Court to overrule the Massachusetts determination and relegate Boston and the Metropolitan District to the water supplies in the eastern part of the state, certainly the burden is on Connecticut to make a peculiarly clear and conclusive showing. I content myself with finding that no such showing has been made. Giving the proof of Connecticut the utmost weight it no more than raises a doubt."

The Special Master further finds on pages 49 and 50 of his report, as follows—

> "Connecticut in this respect is calling on the Supreme Court of the United States to determine how much water supply is now available and will continue available for a long period of time for the inhabitants of the whole northeastern part of Massachusetts; to determine how much of this water is fit for human use and will remain so for a long period of years; to say how much of it ought to be fitted for use, involving cost and expense of fitting reasonable to be imposed on the public; and to divide the supplies among the towns and cities and other communities of the region."

The Complainant has excepted (Exceptions Nos. 61 to 65, both inclusive) to this ruling by the Special Master. It is plain from an examination of both the original Answer and the Amended Answer filed by the Commonwealth of Massachusetts that its principal claim to defeat the Bill of the Complainant and to prevent the remedy applied for was based upon these two affirmative allegations made by it. These affirmative allegations are set forth at length in paragraphs 17 of Reprint

of Defendant's Answer, pages 19, 20, 21, 22 and 23 and in the first and third allegations as set forth on pages 30 and 32 of the Reprint of the Answer. No one reading these excerpts from the Answer can but feel that the strength of the Massachusetts case rested upon the truth of the matters therein alleged. Having raised these issues, it is the claim of the Complainant that the burden is squarely upon the Commonwealth of Massachusetts to sustain their burden of proof and to prove at least by a preponderance of evidence that there exists in eastern Massachusetts no sources of supply which can furnish the people of that territory with a pure and unpolluted water for drinking purposes and that if it is impossible to acquire the water of the Ware and Swift Rivers that serious injury and damage will follow to the people of Boston because it will be impossible to furnish them with a safe and adequate supply of water for domestic purposes. It is with these considerations in mind that we proceed to discuss the available supplies in the eastern part of Massachusetts, their availability for use and that they can be made to supply the people of Boston with a pure and wholesome supply of drinking water, if the Ware and Swift Rivers cannot be obtained by the Commonwealth of Massachusetts.

XII. AVAILABLE WATER SUPPLIES IN EASTERN MASSACHUSETTS

In determining whether a given source of water is available for use as a domestic water supply, Professor C-E. A. Winslow, an eminent authority on public health matters, called as an expert by the complainants, laid down three general rules which would influence his decision: first, he would be interested in the final quality of the water which could be produced; second, the cost; and third, the extent to which the taking of a given supply would interfere with other communities both within and without the State. (Joint Summary of Evidence, p. 206.)

The above gives a very concise statement of what fundamentals should be considered in determining the availability of a given water supply.

Massachusetts legislative reports

There have been three important investigations of the water supply problems of Boston and the Metropolitan District. These investigations have generally been of a most comprehensive nature, and have included not only Boston but generally most of the communities in the Commonwealth. These three reports have, however, dealt primarily with the resources which are available for Boston and the Metropolitan District; have discussed their availability, the cost thereof and problems in connection with their operation; and finally made recommendations as to which supply was considered most desirable.

All three of these reports have been submitted in evidence in this case and have been identified as follows:

Massachusetts House Document No. 500, 1895.
Report of Massachusetts State Board of Health, Complainant's Exhibit C-3.

Massachusetts House Document No. 1550, 1922.
Report of the Joint Board on Water Supply, Complainant's Exhibit C-1.

Massachusetts House Document No. 900, 1925.
Report of the Metropolitan Water Supply Investigating Commission, Complainant's Exhibit C-2.

The 1895 report

In 1895, the report of the Massachusetts State Board of Health upon a metropolitan water supply (Complainant's Exhibit C-3) in tabulating the various water resources which were available for its consideration, included the Merrimac River, Lake Winnipesaukee in New Hampshire, the Charles

River, the Shawsheen River, the Ipswich River, the Assawompsett and other ponds, Sebago Lake in Maine, and the Nashua River. The report recommended the immediate development of a water supply from the Nashua River by the construction of a large impounding dam, forming what is now known as the Wachusett Reservoir.

The report further showed that this supply could be supplemented by the use of the waters of the Assabet and the Squannacook Rivers, both of which drain into the Merrimac; and also tributaries of the Connecticut River, the Ware, the Swift, the Deerfield and the Westfield.

The report discussed these various supplies, dwelling on the quality of the water which could be obtained, the cost, and in some cases touching on the interstate features.

At that time, of course, the art of water purification was in its infancy and but few applications of the scientific knowledge which we now have were then available—thirty-five years ago. Nevertheless, the state of the art was such that there was no doubt in the minds of those who wrote the report and who had made the investigation, that the Merrimac River was available, for we find the following in the report:

> "The quantity of water that could be obtained in this way (i.e. from the Merrimac River above Lowell) and for this purpose is unlimited; and, if there were no way of obtaining a better supply of water and one which was above suspicion, *it would be practicable* to introduce water from that source at a *cost somewhat less than from any other source considered.*" (Exhibit C-3, p. xv.) (Italics ours.)

Due to the state of the art at that time, no doubt more emphasis was placed on the original quality of the water than on the final quality; but what is most important in the report of 1895 was that it attempted to lay down a policy which, as

we shall see, later determined future developments of the District in spite of changes in the art. This is set out on the next page of the report, where the Board states:

> "The very great merit of the plan now submitted is to be found in the fact that this extension of the chain of the metropolitan water supplies to the valley of the Nashua *will settle forever the future water policy of the district*, for a comparatively inexpensive conduit can be constructed through to the valley of the Ware River, and beyond the Ware River lies the valley of the Swift; and in a future so far distant that we do not venture to give a date to it, are portions of the Westfield and Deerfield Rivers capable, when united, of furnishing a supply of the best water for a municipality larger than any now found in the world." (Exhibit C-3, p. xvi-xvii.)

The 1922 report

The 1922 report, Exhibit C-1, was prepared under the direction of a Joint Board composed of members of the State Department of Public Health and the Metropolitan District Commission, which investigated the water supply needs and resources of the Commonwealth. This report contains the investigation of sources of water supply, reconsidering the sources investigated in 1895, and including in the investigation the more important sources covered in that report, such as the Charles River, the Shawsheen River, the Ipswich River, the Assawompsett and other ponds in Lakeville, Sebago Lake in Maine, Lake Winnipesaukee in New Hampshire, and the Merrimac River above Lowell. (Exhibit C-1, pp. 153, 154.) The report further includes investigations of the Assabet River and of the tributaries of the Connecticut, including the Ware, the Swift, the Millers, the Quaboag, the Deerfield and the Westfield.

In this report we find, in connection with the investigation of these various supplies, that the following general principles

were adopted: "(1) choice of unpolluted source as far as practicable; (2) utilization of the natural agencies of purification to the greatest practicable extent; (3) prevention of pollution by land purchase and by the enforcement of sanitary rules and regulations; (4) filtration of water, (a) when the population on the watershed is relatively large, (b) when it is desired to permit boating and fishing in the sources of supply, and (c) when the water is unsatisfactory in its appearance, taste or odor; (5) the choice of filtration and other purification methods to be governed by the nature of the supply, by cost considerations, and by the desire to produce a water hygienically safe, attractive in its appearance, tasteless and odorless, and without corrosive properties; (6) the combination of these various natural and artificial protective methods according to local conditions and economical considerations; (7) the storage of filtered water in covered basins as far as this is practicable." (Exhibit C-1, pp. 10, 11.)

This report recommended, after considering other supplies, the development of the Ware and Swift Rivers, tributaries of the Connecticut. However, the report recognized the need of the conservation of the present resources by recommending the filtering of the South Sudbury and Cochituate systems, and the ultimate filtration of all of the Metropolitan Water Supply. Further it recommended that the Ipswich River should be developed by the construction of one or more large storage reservoirs for the joint use of the cities and towns in Essex County. These recommendations other than the Ware and Swift have never been authorized.

Some specific references to this document (Exhibit C-1) may prove of interest.

First, as to the Assabet—

> "Investigations made in connection with the report of 1895 upon a metropolitan water supply indicated

> that the waters of several streams in the upper part of the Assabet River watershed, through which the Wachusett Aqueduct passes in its course to the Sudbury Reservoir, could be utilized for supplementing the metropolitan water supply by diverting them into the aqueduct through some six separate connections. In the report of the chief engineer it is stated that a total drainage area of about 34.4 square miles could in this way be diverted into the aqueduct and thence into the Sudbury Reservoir, and the available yield of the metropolitan sources thus increased about 28,000,000 gallons per day at a comparatively small cost." (Exhibit C-1, p. 166.)

After stating that this scheme had been carefully re-considered, a table was prepared showing the streams which might be diverted for use of and the yield obtained by the Metropolitan District. The report goes on to state the following (page 167):

> "There has been no material change in the character of the water of most of these tributaries since 1895. Their watersheds are for the most part sparsely populated, and water of good quality for water supply purposes can be obtained from them at the present time."

Following this statement the unfavorable aspects of the scheme are commented upon and the report discusses it in comparison with the proposed taking of water from the Ipswich River. We quote from page 169 of this report in reference to the Ipswich River:

> "The conditions in the valley of the Assabet River below the proposed points of taking are quite different from those in the valley of the Ipswich River below the authorized points of taking on that stream. While the watershed of the Assabet River contains large towns and important industries, the watershed of the Ipswich River, on the other hand, contains few manufacturing establishments, of any kind, and, excepting at the mouth of the stream where it enters the sea, no

considerable town. Moreover, the quantity of sewage or industrial waste which finds its way into this river above Ipswich is comparatively insignificant. While sewage and manufacturing waste can be so treated that the resulting effluents may not create offence when discharged into a stream, they will still contain more or less matter which, unless well diluted, may so affect the character of the water that, though perhaps inoffensive, it may be objectionable for certain uses below."

The above quotations show that preference in the development of these waters was being given to the use for dilution of sewage and trade waste to the higher use for domestic water supply purposes by the Metropolitan District.

This report, as stated above, reconsidered the availability of the Merrimac River with filtration. We have called attention to the policy of Massachusetts in regard to the selection of water supply. We have previously noted that this Board expected that the entire water supply of Boston would eventually have to be filtered. In regard to the new supply from the Swift River the report states:

"In planning the Swift River Reservoir the Chief Engineer has chosen to rely upon filtration rather than soil removal or chemical treatment. It may not be necessary to construct filters for this water in the near future, but we believe that the entire *Metropolitan Supply must ultimately be filtered.*" (Exhibit C-1, p. 10.) (Italics ours.)

Furthermore, in the report we find this statement:

"By filtration, supplemented by aeration, and where necessary by chemical treatment, the surface water supplies of the State can be made not only safe but attractive in all respects and at all times." (Exhibit C-1, p. 9.)

Referring specifically to the use of the Merrimac River as an available water supply, the report states:

> "Water taken from the Merrimac River above Lawrence is used for the water supply of that city at the present time after filtration and sterilization, and there is no doubt that the water of this river could be used for the water supply of the Metropolitan District, if necessary, provided it were properly filtered." (Exhibit C-1, p. 160.)

Not only did this Commission and its Chief Engineer and Consulting Engineers consider that the quality of the Merrimac River water was such that it could be properly filtered, but there was no doubt in their minds, as was true at the time of the 1895 investigation, that there was an unlimited quantity of water available, for the report states:

> "Investigations were also made in 1895 with reference to the use of the water of the Merrimac River above Lowell for the water supply of the then proposed Metropolitan Water District, and the results are presented in considerable detail in the report of that year. The Merrimac River above Lowell drains a net area of about 3,979 square miles and above Lawrence about 4,452 square miles, *and if diverted at either place would furnish an almost inexhaustible water supply for the Metropolitan Water District.*" (Exhibit C-1, p. 159.) (Italics ours.)

It will be noticed, by reference to Exhibit C-1, that this report was not a unanimous report. In this document is to be found the minority report of Mr. James A. Bailey, a member of the Metropolitan District Commission and of the Joint Board, pertaining to the waters of the Nashua River at the Wachusett Reservoir.

The Wachusett supply was put in service in 1896 and this supply is in addition to the waters which were being used prior

to that date. We quote the following from Mr. Bailey's report:

> "Since the Wachusett Reservoir first filled in 1908 there has been an abundant supply of pure water for all the inhabitants of the district. The reservoir has filled and overflowed in nine of the fourteen years. *During this period in several years the amount of water wasted, because all the reservoirs were overflowing, has nearly equalled the amount delivered into the aqueducts for use; and in two years the amount wasted has exceeded the amount used.* The largest reservoir alone holds a supply approximately sufficient to care for the needs of the entire district for one and one half years, even if no rain fell during this period, eliminating evaporation from this calculation. The total storage capacity is so great that the district easily passed through four successive dry years, 1908-11, the period of lowest water yield since the Sudbury records were started in 1875, and in the last of the four years the Wachusett Reservoir was drawn down only 17 feet, and promptly overflowed the following spring." (Exhibit C-1, p. 33.) (Italics ours.)

The waste of water by discharge over the spillways of the reservoirs, to which Mr. Bailey refers, is the result of the policy of Massachusetts to attempt to preserve the purity of its water supply resources by "natural agencies." This involves maintaining in the reservoirs large quantities of water at all times, thus reducing the capacity of the reservoir for storage purposes.

The policy of the Metropolitan District has been gradually to increase the amount of water to be reserved in its reservoirs for storage purification purposes, and thus they have constantly reduced the available draw-down capacity of the reservoirs, and consequently, diminished the yield of the sources.

When the Wachusett Reservoir was recommended, it was pointed out (Ex. C-3, p. 69) that by the construction of this

reservoir, the safe supply of all sources of the Metropolitan Water Supply would be brought to 173 million gallons per day. This estimate was based on the reservation in the reservoirs for purposes of storage purification of 10 billion gallons of water. Constant increases of the amounts of water believed necessary to be retained in the reservoirs have resulted in decreasing the safe yield to 147 million gallons per day. By the substitution of modern treatment methods more water can be made available and the safe yield of the sources of supply again increased to 173 million gallons per day.

This is what Mr. Bailey's statement and his accompanying graph bring out very forcefully. His graph shows that the average use of water by the Metropolitan District for the period of 1908 to 1920 inclusive was 115 million gallons per day, and the amount of water wasted was 64 million gallons per day, or a total of 179 million gallons per day, which was available for use during the years 1908 to 1920.

The report of the Metropolitan Water Supply Investigating Commission (House Document No. 900, Massachusetts 1925, Ex. C-2) recognized the possibility of the use of larger amounts of this water in the following statement on page 43:

> "As pointed out in our engineer's report, in the absence of filtration, purification of the water must be secured by long storage in reservoirs. If it becomes necessary to draw from storage excessively, as is now being done at the Wachusett Reservoir, the diminished volume may not afford an opportunity for holding the incoming raw water for a sufficient period in which to assure the complete sterilization and bleaching which is required to produce a satisfactory quality for domestic consumption. If, on the contrary, the water is subsequently filtered after passing through the reservoir, the initial storage purification need not be depended upon, and such a reservoir may be drawn to the very bottom if necessary with no harmful effect.

> The depth to which a given reservoir may be safely drawn is an important factor in determining the dependable yield of that particular source, so that filtration serves to increase materially the available capacity of the supply. In other words, the filtration of the present Wachusett supply would increase the amount of water obtainable from it."

The Engineer of this Metropolitan Water Supply Investigating Commission pointed out on page 71 (Ex. C-2):

> "If we assume, what is a fact under present operating conditions, that the reservoirs must not be drawn to their bottoms, but that certain substantial quantities must be held in them as an aid in maintaining quality, then the estimated capacity of the system will be reduced. It is hard to say how much should be reserved for quality. Any allowance that would be at all satisfactory would mean a large cut in capacity."

And again on pages 83-84, Mr. Hazen said (Ex. C-2):

> "To get the full delivering capacity of the system, the full capacity of Wachusett Reservoir must be available; that is to say, it must be drawn to the bottom when needed. Maintaining quality by storage as at present and getting such maximum delivery are incompatible. There must be a sacrifice of either quantity or quality, or a change in method. When it is necessary to get the full quantity, it should not be done at the sacrifice of quality. The only way in which both can be maintained is by filtering the water."

Dr. Winsor testified (J. S. E., pp. 19-20) that the substantial additions to the Metropolitan Water Supply which are available in comparatively near-by sources, as pointed out by the Metropolitan Water Supply Investigating Commission, had not been brought into the Metropolitan Supply.

The Ware River Act (Chapter 375, Acts of 1926, Reprint of Answer, p. 39) directed the Metropolitan Water Supply Commission to:

> "Consider the recommendations of the metropolitan district commission relative to making available by filtration or chlorination, or both, the waters of the Sudbury and Cochituate watersheds."

Mr. Allen Hazen had pointed out in Exhibit C-2, that 26 million gallons per day were available in these sources of supply, that they were not now used by the district and that they could be made usable by filtration.

Mr. Jacobs, witness for Complainant, estimated that the filtration of the South Sudbury would reclaim 17 million gallons per day of water from present Metropolitan Water Supply sources not now being used.

Dr. Winsor testified (Record, pp. 86 and 87):

> "The Metropolitan District Water Supply Commission was also authorized at that time, on account of the possible acute need of the district, to make practicable certain sources in the southern Sudbury area which had not been used for many years, due to the fact that these sources discharge into the Sudbury River, and flow down through a section of drainage area which had become quite heavily populated, and they were not considered suitable for use . . . . . the Commission decided to pipe this area in the southern part of the Sudbury, ... into the suitable supplies of that district, and to cut out this intermediate area . . . . . from use."

The filtration of the South Sudbury for reclaiming 17 million gallons per day of water not now being used was an integral part of the 15-Watershed Plan described by Mr. Jacobs for increasing the water supply of the Metropolitan

District from sources in the eastern part of the state and discussed in detail hereafter. Another feature of this plan was the making use of the total storage capacity of the Wachusett Reservoir and the consequent reclamation of further quantities of water which Mr. Bailey's report, Exhibit C-1, pointed out were being wasted under existing methods of operation of the Metropolitan Water Supply.

The 1925 Report

This report of 1925 took cognizance evidently of the differences of opinion which existed regarding the selection and method of the development of these available water supplies. The Commission which made this report employed the late Mr. Allen Hazen of New York, a celebrated authority upon the subject of water supply, as its Consulting Engineer, and he called into conference the late Mr. Leonard Metcalf, then senior member of the firm of Metcalf and Eddy of Boston, equally well-known throughout the country as an expert on water supply; and the Commission, advised by these very eminent water supply engineers, reported as follows:

> "It cannot be honestly contended that the taking of the water of the Ware and Swift rivers as proposed in the Joint Committee's report is the only solution of the problem available at this time, even though in some respects it may be the best one." (Exhibit C-2, pp. 34, 35.)

This report agreed with the report of the Joint Board (Exhibit C-1) on the question of filtration of the Metropolitan District supply, but recommended the development of the Assabet in connection with the Wachusett-Sudbury supply.

This report further agreed with the report of the Joint Board (Exhibit C-1) that the Ipswich River should be developed, but called attention to the fact that the supply available from the Ipswich was far in excess of the needs of Essex

County communities, and therefore should be developed for the Metropolitan District as well as for these other communities.

In regard to the diversion from the Connecticut River watershed, the report recommended the use of the upper waters of the Ware River with the provision that a compensating reservoir be constructed on the Ware for the purpose of maintaining the flow of the Connecticut River.

Complainant's investigations

Complainant offered the testimony of a number of engineers who had investigated the various supplies in eastern Massachusetts, which had been referred to in these reports. They made surveys, investigations, and analyses of the water; and after their investigation called attention to the fact that they agreed with the former reports that there was an unlimited supply of water available in the Merrimac River, and stated that there were other supplies in eastern Massachusetts which could be developed to make available 179,000,000 gallons a day for northeastern Massachusetts. (Joint Summary of Evidence, p. 160.)

These investigations were reduced to plans and submitted to the Special Master, showing the detailed method of developing the Merrimac River water, and also details for the other supplies which are referred to in the record as the "Fifteen Watershed Plan."

The methods suggested by the Complainant's engineers differed but slightly from the recommendations of the reports, but in general showed improvements and suggestions either providing a better water or showing more water available than was originally contemplated.

The principal recommendation referred to the Merrimac River; and they proposed the development of a large storage reservoir for the purpose of "utilizing the natural agencies

of purification," as had been suggested as the second principle to be considered, in the policy of Massachusetts. (Exhibit C-1, p. 10.)

In regard to the Fifteen Watershed Plan, the Ipswich development recommended by the Joint Board in 1922, and the Water Supply Investigating Commission in 1925, was supplemented by diverting into this watershed the waters of the Shawsheen River. Otherwise the suggestions of Complainant's engineers are the same as those of the 1925 report; namely, the filtration of the Sudbury supply, the development of the lower Sudbury supply in connection with the Hobbs Brooks Reservoir, and the use of the Assabet by carrying the waters of its tributaries into the already constructed Wachusett aqueduct.

Two particular plans of development for eastern Massachusetts water supply resources were suggested

From the examination of this series of reports (Exhibit C-1, C-2 and C-3) and the investigations of the Engineers who testified for the Complainant, it will be noted that there are two particular projects which could have been developed by Massachusetts instead of the Ware and Swift Rivers. These projects we will refer to as 1. The Merrimac River development, and 2. The Fifteen Watershed Plan.

Merrimac River Development

Much testimony was taken in regard to the use of the Merrimac River. Probably this can best be summarized by a quotation from the Report of the Special Master as follows:

> "It is agreed by all the witnesses that Merrimac water needs modern treatment to qualify it for drinking. The process involved was described by Mr. Jacobs and all the experts accepted his statement. The treatment of such waters consists of several processes.

> First, long storage (30 to 90 days in a large reservoir), next aeration, then chemical treatment for coagulation, then filtration and chlorination. Water is aerated by throwing it into the air or running it over falls or rapids. Chemical treatment for coagulation consists in adding lime and alum which form a hydrate that attracts both bacteria and particles. It also is useful to improve color. Filtration involves a separate reservoir or set of reservoirs in which water is passed through gravel and sand. Finally the water is chlorinated and stored for delivery."
>
> "Every expert agreed that by treatment on the general lines indicated the Merrimac water could be made hygienic."
>
> (Report of the Special Master, p. 46.)

And here we emphasize the point that the suggestion of the eminent engineers who testified, to introduce the natural process of purification, namely, storage, makes this plan an improvement over any other plan which had previously been considered, in spite of the fact that it had been frankly admitted in every report where the Merrimac was under consideration, that there were no insurmountable difficulties in regard to rendering this water hygienic and safe for use.

The yield of the Merrimac River is unlimited

In the reports and investigations no intimation is ever found that there was not an unlimited quantity of water available for the Metropolitan District in the Merrimac River. That quite the opposite was true will be noted in the previous quotations, p. 175. However, after knowing for over thirty-five years that there was an unlimited supply available, when the use was suggested by the witnesses called by the State of Connecticut in this case, immediately witnesses were produced who found other uses for the water and claimed for the purposes of this case that this water was not available. However, they could not have been serious in this intention, for Massachusetts produced a

plan which they claimed improved on the method of obtaining a supply from the Merrimac, referred to as the Merrimac-Ipswich project, testified to by Mr. Kennison (Joint Summary of Evidence, p. 244) which showed a method for the development of 191,000,000 gallons per day (Joint Summary of Evidence, p. 246).

Lawrence, Massachusetts, obtains its water supply from the Merrimac River

Lawrence water supply is obtained by pumping water directly out of the Merrimac River into a filtration plant without previous storage, and relying entirely upon purification by filters, some of which were among the earliest in the United States, and then subsequent sterilization. Lawrence, like the Metropolitan District, has considered from time to time methods of increasing and improving its waterworks system. These investigations have resulted in reports which have guided the city in connection with its own water supply problem. Two of these reports are particularly referred to in this case. The first report was that of 1917, by Morris Knowles, a Consulting Engineer of Pittsburgh, excerpts of which are set forth in the record, pp. 1,511 to 1,527 inclusive, Defendant's Exhibits D-18, D-19 and Complainant's Exhibit C-40 and in the Joint Summary of Evidence, p. 301 to 311. Subsequently a report was made, identified as House Document, No. 1450, of March, 1923, entitled "Special Report of the Department of Public Health Relative to a Water Supply for the City of Lawrence and the Town of Methuen." (Defendant's Exhibit D-16.)

The Knowles Report of 1917

Reference to the Knowles report of 1917 is made by the Special Master who states in his report as follows:

> "Morris Knowles of Pittsburgh, senior member of the firm now employed by Connecticut and proposing Merrimack water, was employed by the city of Lawrence

in 1917 to recommend supplies of water and in this letter to the city said this:

'As a source of water supply the Merrimack . . . is grossly polluted now, and will probably continue to become more polluted as time passes. Under present conditions its purification is incomplete and is attended by certain lapses, which at numerous times in the past have reached a disquieting if not a dangerous stage. Although this supply can be artificially treated and purified so as to be perfectly safe to drink, the weight of disfavor against the stream as a source of supply has become so great and so real as to actually *obliterate any economy in its use.*

We therefore recommend that the Merrimack River be abandoned as a source of water supply for Lawrence.' " (Italics ours.) (Report of the Special Master, p. 47.)

Mr. Knowles in his report further stresses the expenditure for bottled water, to which the Special Master referred as follows:

"For example it appears in the evidence that the city of Lawrence, Massachusetts, is the only town using Merrimac water for drinking. The result is a most extraordinary sale of bottled water in Lawrence. It is delivered generally like milk. 1916 statistics showed that the amount of money paid in Lawrence for bottled water was 55 per cent of the total amount paid for public water for all purposes. To force people to bottled water is not conducive to the public health. Such facts as those about Lawrence also show a reason why public opinion ought to be regarded in selecting water supplies." (Report of Special Master, p. 50.)

The Complainant excepts to this finding first because it is based upon a fourteen-year-old survey which has not been since verified and second, because the analyses of the Lawrence filtered water shows better results than the water now in use by the Metropolitan District. (Exception 58.)

The significant fact in this statement is that it was necessary to rely on data as old as 1916. Surely, did these conditions exist to-day, more recent evidence could have been produced.

Mr. Knowles made his report in 1917 and recommended the Bartlett's Brook as a source of water supply, and in this connection Mr. Knowles said,

> "It may be worth while to point out that one of the advantages of this project,—albeit a doubtful one from the standpoint of quality,—is that in case of emergency, Merrimac River water could be pumped into the reservoir, to be stored for a long time, to supplement the supply. . . . . ."
>
> (Joint Summary of Evidence, p. 311.)

The method employed at the time of Mr. Knowles' report for obtaining a water supply for the city of Lawrence is not at all comparable to the project suggested by the Connecticut witnesses for securing a supply of water for the Metropolitan District from the Merrimac River. The project suggested for the Metropolitan District involved large storage of water never previously considered by anyone. A most careful reading of the Engineers' reports, Exhibits C-1, C-2 and C-3, will show that there is not any suggeston of storage in connection with the filtration and purification of the Merrimac River water. Expert witnesses without exception stated that storage was an important feature, and the witnesses familiar with the Metropolitan District problem admitted that they had not heretofore considered storage in connection with the Merrimac River supply. A plan for adequate storage was not economically available for Lawrence, but in the report of Mr. Knowles rendered to the city of Lawrence in 1917, reference is made to a development on Fish Brook; and the Court will find in the Joint Summary of Evidence at page 310 the following excerpt from the Knowles report:

> ". . . . Description of Proposed Works:— This, essentially, is a purification project in which the preliminary treatment is accomplished by storage and dilution. Since this supply is insufficient for Lawrence even at the present time, the deficiency is to be made up by pumping water from the Merrimac River to the reservoir, where a dry weather storage of about 160 days would be obtained. We could confidently expect that this would effect a considerable improvement in the character of the raw Merrimac river water, both because of dilution and because of the effect of storage. Color would be reduced to about 40 per cent of that in the raw river water, while practically all turbidity and most of the suspended matter should be removed. We may expect a bacterial reduction of not less than 85 per cent, if figures are based upon bacterial counts of the raw river water."

Furthermore, it must be kept in mind that all of the discussion of the Merrimac River referred to in the Knowles report pertain to the conditions of the river at Lawrence. This is not the point suggested for taking the water for the Metropolitan District; the point suggested for the Metropolitan District is at Tyng's Island above Lowell which is the principal contributor of sewage as stated,

> "The various pollutions and *nuisances* shown in these photographs are comparatively unimportant in proportion to the vast quantity of sewage discharged into the river at Lowell, only a short distance above."
>
> (Joint Summary of Evidence, p. 305.)

The distinction between conditions existing now and in 1917 at Lawrence is summarized by Mr. Jacobs, a member of Mr. Knowles' staff who was associated with him at the time the report was made, as follows:

> ". . . . that excerpts of the report to the Lawrence Water Supply Commission of 1917 by Morris Knowles, Incorporated show that one of the

> advantages of the site finally recommended for Lawrence water supply was that Merrimac River water could be pumped into it and stored in the recommended reservoir on Bartlett Brook; that some of the other excerpts show the prejudices and the inefficiencies which existed in Lawrence, all of which he feels have been corrected by the project as outlined for a much larger district than the small city of Lawrence; that in spite of the fact that this report was made 13 years ago and other reports have been made since, Lawrence still takes its water out of the Merrimac River and the filtration plant has been improved; that he does not think that Lawrence objects to the use of the Merrimac River water;"
>
> (Joint Summary of Evidence, p. 183.)

Department of Public Health report

In defendant's Exhibit D-16 is set forth a letter to the Commissioner of Public Health by J. Waldo Smith, Consulting Engineer, from which we quote as follows:

> "Evidently the most practical and most economical course for Lawrence and Methuen would be to revamp and thoroughly modernize their present filter plant so as to insure a delivery of an ample quantity at all times which would be safe, if not entirely satisfactory, or else to purchase water from adjacent towns." (Defendant's Exhibit D-16, p. 68.)

The Lawrence filters

As a result of these reports, both of which show methods of obtaining ample and abundant supplies in eastern Massachusetts other than the Merrimac River, it is interesting to note that the next step which the city of Lawrence took was to retain Mr. Morris Knowles of Pittsburgh to design a filtration plant for continuing to take water out of the Merrimac River. This new plant was built in 1925 and stands as a positive refutation of all of the insinuations in regard to prejudice and

practicability of the use of the Merrimac River for a water supply at Lawrence, and further we emphasize that Lawrence obtains its supply, not as was suggested for the Metropolitan District, above the city of Lowell, but below it, and it does not have even to-day the natural purification obtainable by a large reservoir as has been suggested by Complainant's engineers at the Foster-Martin Pond, or by defendant's engineers on the Ipswich River.

The quality of Lawrence water compares favorably with that of the Metropolitan District

Referring to the quality of water now delivered to the people in Lawrence, Mass., from the Merrimac River, Professor Winslow testified that the water is considered suitable after treatment by filtration and chlorination. He further testified that the typhoid fever rate in Lawrence has been one of the very low rates in this country, showing the absolute protection to public health which has been afforded by the Lawrence waterworks since the installation of its modern filtration plant. But what is still even more outstanding in regard to the quality of the water now being furnished to the city of Lawrence is the fact that Lawrence, with less complete and effective purification than proposed for the Metropolitan District, has obtained a water which, in at least one or two years, has been pronounced by the Massachusetts State Department of Health as better than that of the Metropolitan District. (Joint Summary of Evidence, pp. 203, 204.)

Points advanced by Massachusetts as reasons for not choosing the Merrimac River

Massachusetts, through various witnesses attempted to show, in defense of its action in choosing the Ware and Swift in preference to the Merrimac, that there were a number of

obstacles which would interfere with the use of this stream as a supply of water for the Metropolitan District. These objections included (1) Pollution of the river; (2) The damages to power interests in Lowell and Lawrence; (3) Possible damages to navigation; (4) The possibility of a breakdown due to the human element in the purification process.

Pollution of the river—the Merrimac River drains a large area in the States of New Hampshire and Massachusetts. On its watershed are located many towns and factories; and in this respect it is not much different from any other stream of its size and character in the United States; in fact the records will show that it is far less polluted than most rivers, and that its condition, as evidenced by the analyses, has been steadily improving. The Special Master found:

> "The Merrimack is a polluted river. It drains a large watershed mainly in New Hampshire but partly consisting of the Nashua watershed, the major part of which is in Massachusetts. . . . . It is a district of large population and enormous factory development, the larger part of which is in New Hampshire. There is no question about the pollution of the water. There is no certainty of its improvement and no certainty that it will not become more polluted.
>
> * * * *
>
> Among the reasons for thinking that the pollution of the Merrimac is unlikely to decrease is the testimony of officials of New Hampshire. For example Charles D. Howard, Chief of the Division of Chemistry and Sanitation of the New Hampshire Board of Health, testified that there had been an unwritten but well understood public policy in New Hampshire, that the communities and industries of the state should not be burdened with the treatment of sewage or industrial waste. The Merrimack River has thus become a legalized public sewer. The conditions in this respect are practically beyond the control of Massachusetts as

> water taken from the Merrimack would be taken out at Tyng's Island about midway between the city of Lowell in Massachusetts and the New Hampshire line.
>
> A considerable amount of industrial waste from such factories as paper mills, tanneries, rendering works, cellulose plants, cotton mills, woolen mills, gas works, of which there are many in New Hampshire, is peculiarly difficult to eliminate from water." (Report of the Special Master, pp. 45, 46.)

However, the Special Master answers his own statement in regard to the pollution where we find in his report,

> "Every expert agreed that by treatment on the general lines indicated the Merrimack water could be made hygienic." (Report of Special Master, p. 46.) (Exception 59.)

The Complainant excepted to the following finding of the Special Master (Exception 59): "The Merrimack River has thus become a legalized public sewer."

This was based no doubt on the testimony of Charles D. Howard, that the policy of New Hampshire was not to burden communities and industries in that State with the treatment of sewage and industrial wastes. Such a policy is indefensible and is not an indication of the trend of the times; but it is reasonable to assume that New Hampshire and other New England States will adopt a forward-looking policy in the protection and conservation of their streams, as is now being carried out by Connecticut. (Wadhams, Joint Summary of Evidence, p. 142-150 incl.)

Mr. Knowles in 1917 stated in his report, "In the same year (1887) the Merrimac was declared an open sewer by the State legislature." (Joint Summary of Evidence, p. 302.) An examination of the Massachusetts statutes shows no such legislative enactment. The only thing which might lead one to that

impression is the limitations upon the jurisdiction of the State Board of Health in regard to the sanitary condition of the inland waters of the state. Such jurisdiction applies to all waters "with the exception of the Merrimac and Connecticut Rivers and so much of the Concord River as lies within the city of Lowell, and the ponds and streams over which the Metropolitan Water Board has control." (J. S. E., 218.) That there is no intention to declare the Merrimac an open sewer is supported by the fact "that in 1924 a plan was made to get rid of the sewage on the Merrimac River from Tyngsboro to the sea" and "that the project of building an intercepting sewer along the Merrimac River was considered because of the objectionable conditions complained of in that river below Lawrence and Haverhill down to the tidal portion of the river several miles below Haverhill." (J. S. E., 222-223.)

It will be remembered that Lawrence and Haverhill are many miles below the point where it has been suggested that water be diverted for use in the Metropolitan District. In spite of this plan to remove the sewage from the Merrimac River, the Special Master found on page 45 that "there is no certainty of its improvement and no certainty that it will not become more polluted." The fact that a plan has already been devised for taking sewage out of the river over such a large portion of the stream in the Commonwealth of Massachusetts, refutes this. Not only has a plan been prepared but the Chief Engineer of the Department of Public Health testified that the building of an intercepting sewer along the Merrimac was considered because of the objectionable conditions complained of in that river *below* Lawrence and Haverhill, and further that if one-third of the low water flows of the Merrimac River above Lowell should be diverted by the Metropolitan District for water supply purposes, it would probably bring about *the immediate construction of a*

sewerage system or sewage disposal works, whichever they chose to build; this, according to the Chief Engineer, *would be an inevitable consequence of the diversion.* (J. S. E., page 223.) In regard to improvement in the past, this was shown very clearly by Defendant's witness, Eddy, who presented figures showing the marked improvement of the quality of the water in the Merrimac River at the intake of the Lawrence filter plant, showing a reduction in the B. coli index of from 10,300 per 100 cubic centimeters in 1918 to 3,400 in 1929, and even going back to 1906 when the B. coli index was 16,700 per 100 cubic centimeters, and further the witness correctly noted that there is a decided drop in the records of the B. coli tests since 1921 when the index was 19,000 per 100 cubic centimeters and the decline since then has been marked and steady. (J. S. E., page 280.)

Damages to water power interests in Lawrence and Lowell

The Special Master found certain minor objections to the use of the Merrimac River water, among which was in regard to the needs of the factories of Lawrence and Lowell for water power. In his report he states:

> "The testimony does not enable me to make a definite finding thereon but I think there is a probability of this damage turning out to be serious to the existing factories and future factory operations at Lowell and Lawrence." (Report of Special Master, p. 48.)

The water power rights which would have to be acquired if water was diverted above Lowell includes certain power developments in these two cities. The value of these rights has been estimated by various witnesses at from one to eleven million dollars.

> (Jacobs, Joint Summary of Evidence, p. 183.)
> (Fuller, Joint Summary of Evidence, p. 274.)
> (Uhl, Joint Summary of Evidence, pp. 256, 257.)

Whatever the damage may be to these water power rights it was included in all of the estimates of cost of this project, concerning which the Special Master found,

> "So far as cost is concerned there is no vast difference between the schemes and any of them is within the means of Massachusetts." (Report of the Special Master, p. 48.)

However important the value of these water rights are as measured in dollars, the Special Master should not have given any weight to this matter in considering the diversion of water from the Merrimac River. In the first place there was no evidence put into the record to show what the damages are to the water powers in the Connecticut River tributaries. The Special Master found damages at one site in Connecticut of $80,000, but Massachusetts declined to furnish any information as to the water power damages which would be affected on the Chicopee River and its tributaries in the Commonwealth of Massachusetts. The record does show, however, that in asking the Great and General Court of Massachusetts for an appropriation to carry out this work, it was estimated that the cost of real estate, rights of way, business damages, water rights, diversion damages, and so forth, would be $12,015,860 (Defendant's Exhibit D-6). The record further shows that while none of the water rights have yet been acquired, practically 60% of the land has been acquired at a cost of approximately $4,200,000, leaving a balance of almost $8,000,000 for the remaining 40% of land to be acquired *and the water rights* as compared to possibly $5,000,000 on the Merrimac.

Furthermore, the Special Master should have found that the amount of water power which would be lost by this diversion was insignificant in comparison with the capacity of the enormous steam power plants which have now been developed

in these cities which is far in excess of the hydro-electric power which is available. (Joint Summary of Evidence, p. 182.)

And finally, in holding that the use of water power is an objection to the diversion of water for domestic purposes, the Master should have given weight to the pronouncement of the Joint Board.

> "While Massachusetts has abundant water resources, it must not be forgotten that there are other uses for water than those of public water supplies,—notably uses for power development and for recreation. The streams afford necessary drainage opportunities and the catchment areas cannot be given over entirely to water collection. Obviously there are many conflicting interests which must be adjusted. We believe that they can be adjusted satisfactorily if the water needs and resources are considered in a broad way, in a spirit of fairness, and with recognition of the possibilities which lie in modern science. *The use of water for domestic purposes should be recognized as having the highest claim,* but cities must strive to restrict waste and utilize trustworthy methods of water purification in order that existing supplies be maintained as long as economical considerations warrant their retention." (Exhibit C-1, p. 7.) (Italics ours.)

Possible damages to navigation

It was maintained that the use of the water of the Merrimac River for domestic purposes would result in damage to navigation in the lower reaches of the river. In this respect the Special Master found:

> "I have no means of finding out what the Secretary of War would do, but I think the navigation is important enough (and there are projects to improve it) to justify the conclusion that 200,000,000 gallons a day cannot with certainty be taken by Boston at Tyng's Island." (Report of Special Master, p. 49.)

On the other hand, the War Department has already found that the flow required by navigation is only 85 cubic feet per second. Massachusetts experts based their assumptions primarily on the action taken by the Secretary of War in regard to the Ware and Swift Rivers without giving any consideration whatever to the fact that the Connecticut River is an open tidal estuary, while the Merrimac River is slack-water navigation. And, although the Report of the Army Engineers on the navigation on the Merrimac River was referred to in the evidence, yet Massachusetts experts were not aware that the recommendations of the Army Engineers as set forth in this Report state that only 85 cubic feet per second were required for navigation as contrasted with the assumptions of Massachusetts experts, as set forth by the Special Master, as follows:

> "They (Massachusetts experts) say the Secretary of War doubtless would restrict the diversion on the same principle he applied to the Ware and Swift, namely, by limiting the diversion to flows in excess of .6 of a second foot per square mile of drainage area." (Report of Special Master, p. 49.)

This is equivalent to limiting the diversion to water in excess of a flow of 2,400 cubic feet per second. (Joint Summary of Evidence, p. 244.)

This limitation is suggested by Massachusetts witnesses as an aid or safeguard to navigation in spite of the fact that the Army Engineers' figures show that the greatest amount needed for navigation in the driest year would be 85 cubic feet per second (Joint Summary of Evidence, p. 182), which is a substantial variance from the finding of the Special Master; and we submit that there was not any competent evidence in the case upon which the Special Master could base such a finding.

It will be remembered that the report of the Joint Board in 1922, Complainant's Exhibit C-1, agreed with the report of 1895, Exhibit C-3, that the water supply from the Merrimac was "almost inexhaustible" (Ex. C-1, page 159). The Joint Board must have taken cognizance of the question of navigation on the Merrimac River, because both of the documents referred to by Dr. Winsor (J. S. E., page 215) were published prior to the Joint Board's report. The report on the Merrimac River, Defendant's Exhibit D-11, was published in 1914 and the report of the Secretary of War, House of Representatives Document 1813, Sixty-fourth Congress, second session, was printed January 2, 1917, and it was this report which found that the requirements of navigation on the Merrimac River were only 85 cubic feet per second. (J. S. E., page 182.)

Possibility of a breakdown due to the human element in the purification process.

In expressing their preference for an unpolluted source over purification of one known to be polluted at the outset, Massachusetts experts continually intimated the breakdowns in the purification processes and seemed decidedly disturbed by the so-called human element. They cited many things which might occur which would interfere with the purification process. These are set forth in Exhibit D-27, which Exhibit states as follows:

> "Even though modern means of purification of a polluted water supply be used there still remains the hazard of interruption of the processes of purification from one cause or another. The various causes of interruption in service are illustrated herein."

Exhibit D-27 lists thirty-four instances of alleged breakdowns in purification processes. These may be divided into groups of causes.

Breaks in Mains .....(6)

Breaks in mains are as likely to occur in an unfiltered supply as in a filtered one. The main supply for the present Metropolitan District from the Wachusett Reservoir to the Sudbury Reservoir is carried by one aqueduct only, the Wachusett. In plans for the supply from the Merrimac River parallel lines are included.

Chlorination Failure .....(6)

The possibility of interruption in chlorination process is admitted. There still remain, in the proposed Merrimac scheme, storage and filtration. Or until chlorination repairs could be made the entire supply could be drawn from Wachusett Reservoir.

Poor or Lax Operation .....(6)

Poor operation of a filter plant is on the same level as carelessness in patrolling a watershed from which an untreated supply is to be drawn and because of the triple processes used purification is more reliable in this respect.

Trade Wastes .....(2)

A sanitary survey of the Merrimac River above Tyng's Island reveals nothing in the drainage area as far as Concord, N. H., 45 miles above the intake, that would be objectionable, or impossible to treat in the plant proposed. Complainant's experts have testified that storage will effectually remove such trade wastes.

Structural Failures .....(3)

Witness Gregory (Record p. 2196, et seq.) explained the reasons for the failure at Baltimore, which was one of

the structural failures. He called attention to the error in Exhibit D-27 in that coagulation basins were not destroyed and the exhibit failed to explain that Baltimore immediately put into operation its second set of filters to treat the city water supply.

Floods .....(2)

The pumping station on Merrimac River as proposed is elevated well above the maximum flood that has ever occurred and there is no possibility of floods affecting either the Foster-Martin storage reservoir or the filter plant below it due to the small drainage area.

Character of the Raw Water .....(2)

Changes in the character of the raw water in the Merrimac River will be taken care of by the Foster-Martin detention reservoir, so that the quality of water delivered to the filtration plant by treatment will be practically uniform as a result of storage so that the conditions described as having happened at Detroit could not happen here.

Other causes .....(7)

Among these are abnormal draft, alterations to plant, short circuiting, freezing, defective pump packing, and one item of general breakdown at Philadelphia where the data are not given.

All of these objections in regard to the possibility of the human element in the operation of such a water works system as that proposed for the development of the Merrimac River were summed up and answered by defendant's witness, Winslow, an undoubted authority on water supply and public health matters.

In regard to the human element in the operation of municipal water works, Professor Winslow stated:

> "I think the human element is, on the whole, more important in these stored supplies than it is in a treated supply, because in such storage supplies as now are used by Massachusetts the safety of the city depends on the efficacy of patrolmen and people who are watching the reservoirs, where there is a far greater element of danger than there would be in the operation of a modern mechanical treatment plant.
>
> Q. What you say about stored waters of the Metropolitan District isn't borne out by any disease statistics that you have, is it? A. No.
>
> Q. Boston's typhoid record is as good as any city, isn't it? A. Excellent, yes, and I think it would continue to be with a more scientific type of treatment.
>
> Q. But the scientific type of treatment, for what it is worth, can be applied just as well to the stored waters of the Metropolitan District as to the polluted Merrimac water, can't it? A. That is what we are proposing to do, store the water of the Merrimac until it is about as pure as the present supplies, and then filter it and chlorinate it.
>
> Q. So that the possible breakdown of the municipal government in this respect wouldn't affect your judgment at all as to where you went for the water? A. I can't conceive of a possibility of breakdown with a 60 or 90 days' storage and the treatment plan here provided. (Joint Summary of Evidence, pp. 208-209.)

Professor Winslow further testified, referring particularly however to the 15-watershed plan:

> "The chief argument, as I get it, against the sanitary quality of these supplies was the fact that they came from thickly populated areas. I think that is a real, but a very minor element in judging of suitability for treatment. On the one hand, I should say that, well,

> certainly a large number of the worst typhoid epidemics on record have occurred on almost uninhabited areas, where the sewage from a single farm house has got into a stream. Plymouth, Pennsylvania, Butler, Pennsylvania, New Haven, have been mentioned here. One could cite scores of such instances. Therefore, a limited population is no safeguard. Nor is a considerable population on a watershed necessarily a menace. It depends entirely on the actual conditions which exist. One might consider, for example, such a reservoir as the Chestnut Hill distribution reservoir of Boston, surrounded by crowded apartment houses, and yet much freer from the danger of pollution than many remote lakes. Therefore, I think the only real test is the quality of the water as indicated by the methods which science gives us." (Testimony, pp. 2256-7.)

Professor Winslow was emphatic in placing reliability on modern methods of treatment as against the unreliability of patrolmen in looking after mountain supplies coming from areas where there is comparatively small population.

Referring specifically to the Merrimac River project Professor Winslow testified

> "That breakdowns in water plants have been rare in relation to the number of plants operated; that they have been either due to flooding, or to breakdown of smaller filter plants, or to instances where simple chlorination is used with no other precaution; (2262) *that he knew of no instance in the history of public health of the failure of such a plan as is proposed for treatment of the Merrimac River;* that the Merrimac River plan provides a triple safeguard; that one of the three elements of the protection might break down once in 10 years; that two of them might break down simultaneously once in 36,500 years; that three of them would fail to work on the same day once in 133,000,000 years." (Joint Summary of Evidence, pages 213-214.)

Public opinion

The Special Master found that one of the principal objections to the use of Merrimac River water was that of public opinion. The importance which he attached to this feature of the case is reflected in the following quotation from his report:

> "The first fact, and I think it quite important, is that the people of Massachusetts have decided against the eastern water supplies by passing the Ware and Swift legislation." (Report of Special Master, p. 29.)

> "I think these investigations and the legislative acts show a public sentiment against the eastern water supplies and make a prima facie case that these supplies are inadvisable, either because inadequate or unfit." (Report of Special Master, p. 30.)

> "The Connecticut experts except Professor Winslow, expressing preference for a supply of pure water over a polluted supply, also said that public opinion has to be considered and sometimes is controlling; that is that a settled opinion (it may be prejudice) is to be regarded." (Report of Special Master, p. 47.)

> "Our governments in the long run are controlled by public opinion." (Report of Special Master, p. 50.)

The above quotations indicate that the Special Master gave undue weight to the question of public opinion, entirely overlooking or ignoring the fact that public opinion is merely a preference, a choice, and possibly a public manifestation of ignorance of the true conditions. Public opinion favors the tried as against the untried. It often favors the continuance of the old and obsolete as against the new and modern. Public opinion may still prefer the clear, sparkling water even though it be dangerous and unknowingly contaminated, to a less attractive water physically which has been carefully and scientifically treated.

Furthermore in regard to the influence of public opinion in deciding matters of this kind public opinion when properly educated will realize the needs and advisability of adopting modern methods. Professor Winslow stated:

> "that every well regulated Health Department has its division of Health Education and one of its chief duties is to produce modifications of public opinion in the line of scientific development, such as immunization against typhoid and diphtheria, control of tuberculosis, regulation of diet, and pasteurization of milk; that he believes it would be possible to convince the citizens of Massachusetts that the prejudice against the Merrimac supply was unreasonable." (Joint Summary of Evidence, p. 214.)

It will be remembered that it was Mr. Eddy who cited and presented in defendant's Exhibit D-27 the tabulations of interruption in the purification processes. Mr. Eddy in a report at Cincinnati stated:

> "While there may be sentimental objections to the discharge of sewage into this river from which a domestic water supply was taken, such objection should not prevail against reason and experience which demonstrate that this water when properly treated is an acceptable and potable water for domestic consumption." (Joint Summary of Evidence, p. 289.)

This shows Mr. Eddy's willingness to educate public opinion to accept modern methods of scientific treatment.

The bacterial condition of the Ohio River at Cincinnati was found to be 2,980 colon bacilli per hundred cubic centimeters (Joint Summary of Evidence, p. 204), as compared to 3,400 in the Merrimac (Joint Summary of Evidence, p. 280), so that there was little difference in the quality of the two streams.

Referring to the Ohio Mr. Eddy wrote in his report:

> "A careful study of the bacterial tests of the water treated in the Cincinnati water filtration plant indicates that this plant is capable of successfully handling any water likely to be delivered to it under present conditions." (Joint Summary of Evidence, p. 290.)

And in regard to the Ohio River, Mr. Eddy testified:

> "that most of the cities along the Ohio River discharge their sewage into the river, and that this water when properly treated is a safe and potable water for domestic consumption;" (Joint Summary of Evidence, 290).

Modern trend towards the adoption of filtration in the protection and preparation of a public water supply

Much evidence was produced in regard to the adoption of filtration and purification processes as compared to the use of comparatively unpolluted sources. In regard to this preference, the Special Master found:

> "Dr. Rudolfs testified that he thought the treatment proposed (some storage, filtration and chlorination) would furnish a safe water, but admitted that other things being equal he would prefer a supply of pure water to polluted water." (Report of Special Master, p. 36.)

> "I think the experts on water and pollution called by the plaintiff and defendant are equally competent and honest in their views. The difference between them seems partly to be a difference between two schools of thought. One looks most favorably on the sinner repentant, the other will have none of him except on compulsion. The one school has the fullest confidence in the processes involved in modern treatment of polluted water and lays less stress on pure source of supply. It suffices them to feel that water will be delivered to the consumer pure. The other school is

> skeptical about the infallibility of water purification processes and seeks waters that are pure at the source." (Report of Special Master, p. 40.)

Mr. Eddy also testified (Joint Summary of Evidence, p. 290), that Cincinnati and Louisville had storage of their water in 1912 and 1913 and that the result obtained by something like five days storage on the fill and draw principle with two reservoirs produced an excellent result from a bacteriological standpoint; that forty or fifty years from now it may be "that we won't drink any water unless it is scientifically treated"; that he would say that is almost the case today; that he built a plant at Greenwich, Connecticut, which has pre-aeration, pre-chlorination, storage for sixty or ninety days, coagulation, sedimentation, filtration, chlorination, and post-aeration,—all that is practically possible to do at the present time to make polluted water safe; that he thinks they are getting very good water in Greenwich.

One school of thought prefers to trust to an unpolluted stream while the other school desires to deliver to the public a pure water and applies modern science to guarantee the safety of the final product delivered. This is a matter of choice or preference, even though this choice or preference be that of a technical expert. But, the exercising of a preference involves the premise that the choice might be made freely and unhampered. Such is not the case with interstate waters.

All the witnesses agreed that plants for filtrating and purifying water are now in constant use, and purifying water for domestic use, not only for cities throughout the United States, but in the largest cities of the world. This was a fact which was shown, not only by the evidence of the eminent witnesses who testified, but also by their experience in building such purification plants.

Mr. George W. Fuller, a witness called by the defendants, stated (Joint Summary of Evidence, p. XLII):

> "I particularly had to do with the selection of type, design and supervision of construction and operation of numerous sizable water purification plants such as those at Louisville, Cincinnati, Little Falls (East Jersey Water Co.), Hackensack Water Co. plant at New Milford, New Jersey, Philadelphia, Baltimore, Washington, Richmond, Memphis, Dallas, New Orleans, Kansas City, Minneapolis, Buffalo, Montreal, and many other smaller plants."

Mr. Harrison P. Eddy, who testified to vast experience in sewerage works, "recommended the filtration of the water supply and the treatment of the sewage" at Milwaukee. (Joint Summary of Evidence, p. XXXVII.)

Mr. Frank A. Barbour, an expert for Massachusetts, listed among his experiences the filtration plants at Marblehead, Mass., Frederickton, N. B., Montreal, Canada, and Akron, Ohio. (Joint Summary of Evidence, p. XXXIII.)

Mr. Robert Spurr Weston, an expert witness for Massachusetts, gave among his important works the construction of filtration plants at (Joint Summary of Evidence, p. XX),

"Amesbury, Mass.
United Fruit Company, Cuba.
Belfast, Maine.
Cohasset Water Company, Mass.
Exeter Water Works, N. H.
Gorton Pew Fisheries, Gloucester, Mass.
Hartford, Conn.
Hartford Water Company, Vt.
Keene, N. H.
Merrimack, N. H.
Middleboro, Mass.
Mt. Holyoke College, Mass.

New Market, N. H.
Oklahoma City, Okla.
Oldtown, Maine.
Reading, Mass.
Sayles Finishing Plants, R. I.
Sayles-Biltmore Bleacheries, Asheville, N. C.
South Orange, N. J.
Wakefield, Mass.
and other places."

Dr. Frank E. Winsor, an expert witness for the defendant, testified he was "Chief Engineer on the design and construction of a new water supply for Providence, Rhode Island—which supply included—the filtration plant of 50,000,000 gallons capacity." (Joint Summary of Evidence, p. XVII.)

The Complainant excepted to the failure of the Special Master to find that the expert witnesses for Massachusetts were in substantial accord that the present source of supply should be treated. (Exception 60.)

Massachusetts experts stated that in their opinion the water supply now in use by the Metropolitan District should be safeguarded by treatment.

(Barbour, p. 268; Eddy, p. 283, Joint Summary of Evidence.)

The developments in the art and science were well summed up by Professor Winslow and we quote his testimony in full (Testimony, p. 2259):

"I agree heartily with what Mr. J. Waldo Smith said this morning, that we are going to make progress in social comity and in co-operation between states, which is the real way to settle such problems as are involved in the Merrimac and Connecticut. Finally I think the

really sound lesson in regard to this question is to be drawn from the experience of northwestern Europe for a population concentration far in excess of what we may reasonably expect here has already been reached, where industrial development as in Belgium and in northwestern Germany is on a colossal scale and where water supplies have been taken for 25 years from highly polluted streams running through industrial districts and treated with complete success. I think if any thing the tendency of the future in this country, as far as I can forecast it will be along this line, towards the more scientific and more intensive use of our water resources rather than along the line of an attempt to discover the ever-receding Gardens of Eden which require no repentance. I may say I was brought up like the other experts on this innocence and repentance theory, but experience has made me a convert to the doctrine of original sin. I would rather insist on wholesale repentance in all cases.

MR. WARREN. That is the reason you prefer we should have a polluted source rather than a pure one, is it?

THE WITNESS. I would rather have the sinner who has repented than the supposed innocent who has not, Mr. Warren."

Methods of scoring water supply

Mr. Eddy produced a method of scoring water supply where he attempted to rate the water supplies, depending upon the quality of the water and the methods of treatment.

Before considering Mr. Eddy's methods of rating, one should not lose sight of the fact that the quality of the raw water of the Merrimac River even down at Lawrence, which is

below Lowell the point of major pollution of the stream, is not materially different from the conditions in other rivers. The condition of the river from a hygienic standpoint was measured by the experts by the use of what was known as the B. Coli index which is the statement of the number of B. coli present in 100 cubic centimeters of water. The B. Coli index thus derived for a number of water sources used by other cities was testified to by defendant's witness, Eddy (Record, p. 2060) and plaintiff's witness, Winslow (Joint Summary of Evidence, p. 204), and for convenience we tabulate their testimony as follows:

	Colon Bacilli per 100 Cubic Centimeters	
City	*Winslow*	*Eddy*
Henderson, Ky.		1,740
Toledo, Ohio	1,980	1,650
Pittsburgh, Pa.	2,058	
Louisville, Ky.	2,220	2,220
Huntington, W. Va.		2,370
Grand Rapids, Mich.	2,563	
East Liverpool, Ohio		2,680
Trenton, N. J.	2,891	
Cincinnati, Ohio	2,980	2,980
St. Louis, Mo.	3,120	
Lawrence, Mass.	*4,200*	*3,400*
Portsmouth, Ohio		3,490
Evansville, Indiana		3,940
Reading, Pa.	4,219	
Youngstown, Ohio	5,450	6,930
Philadelphia, Pa.	5,899	
Niagara Falls, N. Y.		8,290
Elmira, N. Y.		9,450
Ashland, Ky.		11,500
Ironton, Ohio		14,900
Kansas City, Kans.	15,892	
Albany, N. Y.	19,400	19,400
Chester, Pa.		20,500
Indianapolis, Ind.	22,500	

Professor Winslow carefully analyzed Mr. Eddy's testimony and Exhibit D-28 on his method of scoring. In this connection he testified that

> "he had examined Mr. Eddy's score of water supplies: that a water supply is supposed to be satisfactory if its total number of points equals 100; that a total of 91 can be obtained on raw water alone without reference to subsequent treatment used; that population per square mile is the governing factor in the score as any wide variation in that item cannot be overcome by other items; *that water distilled from the Merrimac River or from the Lea River used by London would be penalized 40 to 60 points out of 100 because of the source from which it* originally came; that the Eddy score is of no substantial significance with regard to the quality of a water; (2269) that the population of the United States in general is going to be stable very shortly and that his studies indicated that Massachusetts would not be exceptional in that regard; (2270) that if the ultimate quality of the water delivered were the same, the cost the same, and the relative effects upon other communities were the same, it would be a matter of indifference what the quality of the RAW water was;" (Joint Summary of Evidence, p. 214.)

> "In view of these results I can not think this method scoring is likely to be received as a substantial contribution to engineering science." (Testimony Winslow, p. 2267.)

There are available in Eastern Massachusetts other supplies than the Merrimac River.

Mr. Jacobs, an expert witness for Connecticut, testified (Joint Summary of Evidence, page 168), that if the Merrimac project were adopted, additional supplies would not be required but that there were other sources of supply in eastern Massachusetts which he had studied and found available. He described a plan for taking water from the Ipswich River, the

Shawsheen River, the Assabet River, the Lower Sudbury River and from portions of the South Sudbury River not at present used by the Metropolitan District. He described the availability of these waters and submitted a plan whereby they could be developed and yield the district 157,000,000 gallons per day (Joint Summary of Evidence, page 160). This plan was described as the 15-Watershed Plan.

In substance, and with the exception that Mr. Jacobs' plan included the waters of the Shawsheen River, the 15-Watershed Plan corresponds with the plan for using these water supplies by the Metropolitan District recommended in House Document No. 900, Massachusetts, 1925 (Exhibit C-2).

In House Document No. 500 of 1895 it was recommended that the waters of the Assabet River should be taken when needed as the first addition to the Wachusett supply. When the time came for adding to the Wachusett supply it was found (Exhibit C-1) that 11,000,000 to 17,000,000 gallons per day was available in the Assabet River.

These supplies have never been developed

The report of the Metropolitan Water Supply Investigating Commission (House Document No. 900, Mass. 1925, Exhibit C-2) was considered by the Great and General Court but its recommendations were rejected in favor of the recommendations contained in House Document 1550, 1922 (Ex. C-1), for the development of the Ware and Swift Rivers.

Dr. Winsor for defendant testified (Joint Summary of Evidence, pages 19 and 20), that there had been no development of the "available additions of substantial amounts which can be made to the present Metropolitan water supply from comparatively nearby sources."

Massachusetts admits the availability of certain portions of the water in the 15-Watershed Plan

In the agreed statement of available water supplies in northeastern Massachusetts (page 159, Joint Summary of Evidence) there are included the Ipswich River, good for 70,000,000 gallons per day, and the Assabet River, good for 15,000,000 gallons per day through the year 1970. It is noted in the Joint Summary of Evidence that these supplies are *available but not developed.* The availability of Ipswich River water is further attested by the fact that Massachusetts' witnesses submitted a plan (Exhibit D-25) for the combination of Ipswich River water with Merrimac River water to yield 191,000,000 gallons per day (Report of Special Master, p. 49).

In connection with the admitted availability of the Ipswich River in the amount of 70,000,000 gallons per day it should be noted that on page 160 of the agreed statement of available water supplies, the Ipswich is included, as per the Hazen recommendation. This refers to the recommendation of Allen Hazen as consulting engineer of the Metropolitan Water Supply Investigating Commission reported in House Document No. 900 of 1925, Mass. (Exhibit C-2). The recommendations of Mr. Hazen for developing a water supply from the Ipswich included the installation of a filter plant for treating the water before its use by the Metropolitan District. The Hazen recommendation also included the construction of reservoirs in the Ipswich valley substantially as outlined by Mr. Jacobs for the Complainant. These reservoirs were objected to by Massachusetts' expert witnesses, the reason being that they would be located upon the Wenham Swamp (Report of Special Master, page 38). It is only by the construction of reservoirs that a yield of 70,000,000 gallons per day can be obtained from the Ipswich River which is agreed to be *available but undeveloped.*

Abandonment of these supplies is unnecessary

The Special Master found (Report of Special Master, p. 39), that the supply from the 15-Watershed Plan would be of "uncertain duration."

The basis for this finding of the Special Master is found in the testimony of expert witnesses for defendant, who pointed out the encroachments of permanent and transient population on the watersheds of the sources of supply included in the 15-Watershed Plan, together with the avowed policy of Massachusetts to abandon polluted river sources of supply in favor of upland streams as against rendering these river sources useful by modern means of treatment. But it is agreed by defendant that 70,000,000 gallons a day available in the Ipswich will be good until 2000 A. D. and 15,000,000 gallons per day in the Assabet until 1970 (Joint Summary of Evidence, p. 159), so that the element of uncertainty in the duration of these supplies does not enter the picture for at least 40 years in the future. Mr. Eddy testified for defendant (Joint Summary of Evidence, p. 290) that:

> "40 or 50 years from now it may be that we won't drink any water unless it is scientifically treated."

The expressed policy of Massachusetts with respect to the preservation of the purity of the surface water supplies, is found in Exhibit C-1, pages 10 and 11, previously quoted on page 177.

The carrying out of this policy and the interpretation of how far it is practicable to go in the use of natural agencies of purification together with the decision between filtering and abandonment, are described by witness Winsor for defendant (Joint Summary of Evidence, page 14), who testified concerning the disposition of certain water supplies now in use, when the municipalities owning those supplies applied to the Metropolitan District for admission;

"that when the Metropolitan District takes in the additional population, the District will not necessarily take over the water supplies now used by this population; that they may abandon that supply . . . . . that he has no plans as to what will be done with this water supply that will be discontinued; that it doesn't come under his jurisdiction; that he has not made any study to enable him to advise as to its ultimate destination; that as a rule those supplies are nearing the end of their usefulness, ... are obtained from waters that are polluted by large population . . . . that as to what they are going to do with that water, there is no reason why that should be of any interest to him; . . . . . that he has nothing whatever to do with looking over any water supply in any community to see of what use it can be made and that he doesn't know anyone who has—if they do, he doesn't know who it may be; . . . . ." that the future contemplates "the abandonment of the supplies of these towns that are now supplying themselves, that are within the 10 mile radius, that though he hadn't thought of it in just those terms, but that is what it would amount to."

The 15-Watershed Plan plus present supplies adequate for Metropolitan District

It is agreed (Joint Summary of Evidence, page 160) that the 15-Watershed Plan, according to Connecticut witnesses, will yield 179,000,000 gallons per day. The Special Master found that (Report of Special Master, page 39) "Boston might make available a considerable amount of water from the sources referred to and in the manner referred to, or in some other manner."

The Special Master further found, however, that the water to be realized from the 15-Watershed Plan would be "an inadequate supply" (page 39).

The agreed statement of water supply requirements (Joint Summary of Evidence, page 159) shows that the 1970 demand for water by towns now members of the Metropolitan District will be 265,000,000 gallons per day and that the 15 towns eligible for membership in the Metropolitan Water Supply District, but not now members, will have a demand in 1970 for an additional 50,000,000 gallons per day, making a total of 315,000,000 gallons per day required by all the 35 cities and towns eligible for membership in the Metropolitan Water District.

The Metropolitan District will have available by 1970 (Joint Summary of Evidence, page 159 agreed statement) 134,000,000 gallons per day from its present sources of supply and there will be an additional 18,000,000 gallons per day available from the sources of supply of the 15 towns eligible for membership in the District, making a total of 152,000,000 gallons per day. Of the 179,000,000 gallons per day available in the 15-Watershed Plan, 22,000,000 gallons per day will be required by communities not members of the Metropolitan Water District but located in the vicinity of some of these supplies (Joint Summary of Evidence, p. 160). This leaves 157,000,000 gallons per day (subtracting 22,000,000 from 179,000,000) to be added to the 152,000,000 gallons per day, or 309,000,000 gallons per day available for the 35 cities and towns of the Metropolitan Water District. This supply will be adequate to satisfy the expected requirements of these towns practically until 1970.

XIII. NECESSITY

Sufficient supplies exist for Metropolitan District and Northeastern Massachusetts

As we have shown before, under the heading of "Available Water Supplies in Eastern Massachusetts," there are ample water resources in Eastern Massachusetts to supply not only

the Metropolitan District but also Northeastern Massachusetts for many years to come. It is agreed by the witnesses called by the Commonwealth of Massachusetts that the present developed water supplies, taking the entire section of the State altogether, are in excess of present demands. As shown on Joint Summary of Evidence, page 159, there are 258,000,000 gallons per day available and only 244,000,000 gallons per day required. It is conceded that these 258,000,000 gallons per day can be increased immediately to 343,000,000 gallons per day without using the Merrimac River. (70 M. G. D. from the Ipswich and 15 M. G. D. from the Assabet *available but not developed.*)

If the Ware and Swift water cannot be obtained, Eastern supplies can be made available.

The Complainant excepts, however, to the failure of the Special Master to find that the Massachusetts experts testified that if the Ware and Swift waters could not be obtained, Northeastern Massachusetts could be adequately supplied with water (Exception 66) and failing to give legal effect to this testimony by finding that no necessity exists for the contemplated taking of water. (Exception 74.)

We have previously discussed, under the heading of "Available Water Supplies in Eastern Massachusetts," the fact that all of the Massachusetts' experts admit that, if the waters of the Ware and Swift were not available, these waters in the Eastern watershed of Massachusetts could safely be used for supplying the public. The Special Master found,

> "I have been much interested and impressed by the evidence of the water experts which puts it beyond question that polluted waters by proper treatment may be made hygienic. The experts convince one that even sewage by proper treatment makes an innoxious beverage." (Report of Special Master, p. 45.)

Mr. Karl R. Kennison, a witness for Massachusetts, testified that he

> "has made a study of what might be done with the Merrimac River provided that the Metropolitan District was forced to go to it for additional water; that in his opinion a more practicable scheme would be what might be called flood water only from the Merrimac River."
>
> (Joint Summary of Evidence, p. 244.)

Mr. Kennison was asked by counsel for Connecticut.

> "If by any chance you cannot get the Ware and Swift, it is going to be necessary for you to go to the Merrimac, isn't it?"

The anfractuosities of the witness caused counsel for Connecticut to inquire again:

> "As an engineer, you do not want to go on record as saying that you could not furnish Boston with a supply for 1970, if you had to, from the Merrimac and other eastern supplies?"

to which Mr. Kennison replied, "It is physically possible to do so." (Joint Summary of Evidence, p. 253.)

Similar admissions were made by other Massachusetts witnesses.

Mr. J. Waldo Smith, an expert witness for Massachusetts, testified (Transcript, p. 2176),

> "Q. (By Mr. Averill.) If you can't get the Ware and the Swift then it is going to be necessary to take something in the eastern part, isn't it?
>
> A. Oh, if you couldn't get the Ware and the Swift, you couldn't let the people die of thirst.
>
> Q. Well, they wouldn't, would they?
>
> A. I don't suppose they would.

Mr. Weston E. Fuller testified (Joint Summary of Evidence, p. 275), that if the Ware-Swift as a water supply for Massachusetts was eliminated from the picture, it would be possible to get a supply from the Merrimac, which ordinarily would be safe.

Mr. Frank A. Barbour testified (Joint Summary of Evidence, p. 270),

> "that he agrees that there is no doubt that the water of the Merrimac River could be used for the water supply of the Metropolitan District if necessary, provided it were properly filtered."

The burden was on Massachusetts to show that no supplies existed in Eastern Massachusetts.

The Complainant excepts to the construction being given to the reply to the defendant's answer. The claim of necessity and emergency is an affirmative defense of Massachusetts which should be shown to be of "great magnitude" and proven by "clear and convincing proof." (Exception 67.)

The Commonwealth of Massachusetts pleaded in its answer that it requires a suitable supply of pure and unpolluted drinking water, which can be obtained from no other source within the Commonwealth except from the watershed of the Connecticut River. (Reprint of Answer, p. 30.)

The burden was, therefore, upon the defendant to prove those positive averments. The Special Master states in his report,

> ."In addition Connecticut alleges by an amendment to its bill that the Boston district can well be supplied with good water from the eastern part of Massachusetts and for this reason should be enjoined from subtracting in the least from flow of water into the Connecticut."
>
> (Report of Special Master, p. 6.)

Whereas the Special Master should have found that Massachusetts has not met the burden of its averment. Its reports have shown available sources of water in Eastern Massachusetts and have shown that these could be developed. (Exhibits C-1, C-2 and C-3.) And, as shown above, it has been conceded that these supplies could be made available by proper treatment.

Purifying of water feasible, practicable, and generally accepted in the larger cities of the world.

In determining the question of necessity weight should have been given to the testimony that contaminated or polluted waters can be scientifically treated and rendered into a pure and wholesome product for domestic use. This testimony, given in detail under the heading of "Available Water Supplies" shows that supplies even more polluted than any suggested for the use of the Metropolitan District are being used in the largest cities of the United States; and furthermore, that these plants have been built under the engineering guidance of the expert engineers who testified for Massachusetts in this case. The Merrimac River is now being used by the City of Lawrence (Joint Summary of Evidence, p. 183), the Ipswich River is being used by Lynn and Saugus (Joint Summary of Evidence, p. 218); and in the face of the additional water which is available from these sources alone, it cannot be contended that they are not available for the use of the Metropolitan District and other cities in Northeastern Massachusetts.

In determining necessity the abandonment of usable supplies should not be considered

The Complainant excepted to the effect given by the Special Master to the announced intent on the part of Massachusetts to abandon existing supplies of water because when an emer-

gency or necessity is claimed to exist of sufficient importance to warrant the taking of waters in which another state has an interest, the policy of abandonment of existing supplies should not be permitted. (Exception 69.)

One of the arguments advanced by Massachusetts is the fact that, with the lapse of time, sources of water supply must be abandoned because of pollution. It is set forth by Massachusetts witnesses that, although the present supplies now developed by the Northeastern Massachusetts municipalities are capable of delivering 258,000,000 gallons per day, it is estimated by them that these supplies will yield only 204,000,000 gallons per day in 1970, and 186,000,000 gallons per day in the year 2000. Further, they anticipate that, although the Assabet is now available for an emergency supply of 15,000,000 gallons per day, yet they estimate that by the year 2000 this source will no longer be available.

Before the Commonwealth of Massachusetts can prevail in its plea of necessity it must show that it is doing everything not only to utilize but also to conserve the assets which it now has. It is, of course, true that any large community, growing in population, finds itself requiring more water from time to time to supply its inhabitants. So long as the Commonwealth can confine itself to its own resources it may be liberal in authorizing such a community to take additional supplies for such purposes and to abandon other supplies rather than protect and conserve them; but, on the other hand, when they find it expedient to demand and abstract the waters which naturally flow into another state, and to obtain their supply from such sources, then the same degree of liberality does not exist; and the complete development and conservation of its own resources must be antecedent to the diversion of the waters which naturally flow into another state.

In determining necessity the use of water for industrial and recreational purposes should not be considered

The Complainant excepts to the undue consideration given by the Special Master to the use of water for industrial and recreational purposes. In view of the claim of Massachusetts that the first and highest use of water is for domestic use, we claim that such policy should be applied in the case of their own waters before permitting them to take water in which another state has an interest. (Exceptions 71 and 73.)

Great weight was laid by witnesses testifying for Massachusetts upon the supposition that the water resources of Eastern Massachusetts were primarily necessary for industrial and recreational purposes and process water; and that, therefore, they were not available for use by the Metropolitan District and the communities of Northeastern Massachusetts for water supply purposes.

> ". . . . to maintain a proper flow in the Ipswich River and furnish waters to industries at Ipswich;"
>
> (Goodnough, Joint Summary of Evidence, p. 218.)
>
> "that some of the factories on the Assabet use great quantities of water in the manufacturing processes, the chief of which is the American Woolen Company's mill at Maynard,"
>
> (Goodnough, Joint Summary of Evidence, p. 222.)

The Great and General Court of Massachusetts has given weight to the consideration of the use of the waters of the Commonwealth for recreational purposes as compared to water supply purposes. In Ex. C-1, p. 1, in the Act creating the Joint Board the legislation states,

> "The said board shall also consider and report whether any of the great ponds now used as sources of water supply might better be devoted to purposes of public recreation."

In making its report, the Joint Board took cognizance of the use of water for power and recreation, showing that the conclusions reached were not those compelled by necessity. At p. 7 (Ex. C-1), the report says:

> "While Massachusetts has abundant water resources, it must not be forgotten that there are other uses for water than those of public water supplies,—notably, uses for power development and for recreation. The streams afford necessary drainage opportunities and the catchment areas cannot be given over entirely to water collection. Obviously there are many conflicting interests which must be adjusted. We believe that they can be adjusted satisfactorily if the water needs and resources are considered in a broad way, in a spirit of fairness, and with recognition of the possibilities which lie in modern science. The use of water for domestic purposes should be recognized as having the highest claim, but cities must strive to restrict waste and utilize trustworthy methods of water purification in order that existing supplies be maintained as long as economical considerations warrant their retention."

The report states (Ex. C-1, p. 11):

> "the people's representatives have wisely acted on the principle that the highest use of all the inland waters is that of supplying water for domestic needs."

The conflict of interests is recognized at p. 27 (Ex. C-1):

> "The problem is complicated from the standpoint of water supply because these ponds are also attractive for recreational purposes."

In considering the Merrimac River as a source of supply for the District, the conflict of interests was again apparent (Ex. C-1, p. 162):

> "The use of the Merrimac River would sooner or later reduce materially the quantity of water available for power in this important stream."

Necessity does not mean that a choice can be made of available supplies

The Complainant excepts to the finding and conclusion of the Special Master that the Commonwealth of Massachusetts has the choice of using waters in which it is solely interested or taking waters in which another state has an equal interest regardless of the fact that its own waters can be made available for use. (Exception 70.)

The Special Master gave principal consideration to public sentiment in the choice of supply. While it is true that engineers will give this opinion consideration in determining the advisability of a supply yet, in determining its availability as the ground for pleading necessity, it can be given no weight. The only question, therefore, was whether the supplies were available, whether they could be used, and not whether Massachusetts, by its legislation, chose to use them.

The Master has implied that public opinion compelled the decision of the Massachusetts legislature to take the Ware-Swift waters. He found (Report of Special Master, p. 51):

> "The courts, it seems to me, cannot close their eyes to the necessities imposed by public opinion on governments."

If there was any necessity imposed on the Massachusetts Great and General Court in the matter of the proposed water supply for the Metropolitan Water District it was that of choosing between the Goodnough plan on the one hand (Ex. C-1) and the Gow plan on the other hand (Ex. C-3). There was as much public opinion in opposition to the former following its pronouncement in 1922 as there was to the latter in 1925. This is shown at Ex. C-2, p. 13, 14.

The decision of Massachusetts not to use water which can be made safe for consumption should not be a governing factor in determining necessity.

The Complainant excepts to the finding by the Special Master that the determination that Massachusetts has decided not to use the supplies existing in Eastern Massachusetts but to take the waters of the Connecticut watershed is the most important factor to be considered when a proposed taking of water in which another state has an interest is involved. (Exception 72.)

The Special Master found,

> "Undoubtedly the Ware and Swift acts express the settled opinion of the Boston District and of the state . . . . Our governments in the long run are controlled by public opinion . . . . The courts it seems to me cannot close their eyes to the necessities imposed by public opinion on governments."
>
> (Report of Special Master, pp. 50, 51.)

As stated above, this decision by the Great and General Court of Massachusetts that this constituted necessity, is not material in this case, because of its interstate nature. If the Commonwealth of Massachusetts as a sovereign desired to take property within its own territory for a public use, its determination through its legislative department of the necessity for the taking would be conclusive upon all other departments of government within that Commonwealth. As a practical proposition a determination that the use to which the property is to be put is a public use, is sufficient to determine that the state of necessity exists. Where such a condition is found by the legislature to exist, the mere statement by that legislative authority that the taking is necessary must be accepted by all other departments of the government without review. This

Court has held that the determination of necessity is a purely legislative matter and is not a subject of review by the Court.

(United States v. Chandler, Dunbar Co., 229 U. S., 53, 64.)

The necessity claimed must be an alternative for the exercise of eminent domain and should be construed strictly against the state claiming it

Inasmuch as this Court has held that the determination of the question of necessity, where a sovereign acts within its unquestioned power, is not reviewable, there is more reason to claim that, in the absence of any authorizing legislative act, this Court cannot substitute necessity for a legislative act. If the question of necessity for the taking of private property for public use is a legislative power of such a nature that it cannot be reviewed by the judicial department, then it must follow that the judicial department cannot of its own motion substitute necessity for such legislative act. Therefore, when the Commonwealth of Massachusetts pleads that, by reason of a great emergency existing within its boundaries, it must take the waters of the Ware and Swift because no others waters can be obtained, it is substituting the doctrine of necessity for the power of eminent domain.

Eminent domain is a legislative function of government

As has been shown above, the Commonwealth of Massachusetts is without the power of eminent domain to take property located in the State of Connecticut. It now proposes to substitute the doctrine of necessity, and claims that an emergency for an additional water supply justifies the general rule as to the taking of property. It must, if this doctrine is to be followed, necessarily mean that where a state desires property or property rights located within another state, which it has no power to take under its sovereign power of eminent domain, if

the emergency of necessity is great enough, it will not only justify its taking the step but that it will even justify this Court in authorizing or consenting to the taking of property for public use without the exercise of the power of eminent domain.

Determination of necessity is not a judicial function

If this doctrine of necessity is held up as justification for taking property without the exercise of the power of eminent domain, it must follow that, when this Court is asked to condone such a taking on the doctrine of necessity, it is being asked to apply a doctrine which is essentially legislative in its character. Such authority was never given to the courts. Such doctrine does not exist in American jurisprudence as the doctrine of necessity, as applied to subjects of a different sovereignty. On the ground of necessity, Massachusetts may do anything she desires within her boundaries, so far as her constitution and her sovereignty permit, but she cannot go beyond that. She is seeking some other legislative authority for such action.

Remedy by interstate compact should be exhausted before resort to a court of equity

We agree with the Special Master in speaking of the selection of a water supply, where he says,

> "These questions are engineering and governmental and much fitter to be decided by the cities and towns concerned than by any court. But the questions are only suggestive and whoever passes on them will be taken still farther afield."
>
> (Report of Special Master, p. 50.)

This is the type of controversy which should be settled by interstate compact. This controversy involves the utilization of the resources of the Connecticut River for water supply, navigation, agricultural purposes, power, recreation, and so

forth. The conditions which are most favorable for one use may be entirely different for another. The record shows that the agricultural interests are interested primarily in any reduction in flood heights; on the other hand, from the standpoint of pollution, the State of Connecticut is interested, not only in the floods which flush out the stream, but also in the low flows which are necessary for the dilution of the sewage and the industrial waste burden which comes into the stream; navigation, of course, is primarily interested in the maintenance of the lower flows and in seeing that they are not disturbed; and the same is more or less true of the power interests and of the fishing industry along the river. The policy of the State of Connecticut in regard to the use of its water resources, the policy of the Commonwealth of Massachusetts in regard to the use of its water resources, and of the federal government, in its trusteeship of the navigable capacity and the navigability of the streams,—are all matters of vital concern; and a method has been provided for the handling of this question as a purely legislative function.

Constitutional provisions.

Article I, Section 10, of the Constitution of the United States, provides:

> "No state shall, without the consent of Congress, ... enter into any agreement or compact with another state ...."

It is significant that this provision of the Constitution appears under the heading of the legislative powers of the government of the United States. It is part and parcel of the *first provision of Article I*, which provides:

> "All *legislative powers herein granted* shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives." (Italics are ours.)

So that one of the legislative powers granted by the states in Article I is the right to participate in and have the final approval as to any compacts or agreements entered into by the States.

What governmental rights are subject to compact

In the case of *Kansas v. Colorado*, 206 U. S., 46, in discussing the rights of the states, this Court said:

> "It may determine for itself whether the common law rule in respect to riparian rights or that doctrine which obtains in the arid regions of the west, of the appropriation of the waters for purposes of irrigation, shall control. Congress cannot enforce either rule upon any state."

And again, in the same case, when it was urged that some sort of compensatory water or benefit be furnished by the State of Colorado to the State of Kansas, this Court said:

> "That would be equivalent to this court's making a contract between two states, and that it is not authorized to do."

In the case of *Louisiana v. Texas*, 176 U. S., 1, 17, which was cited at some length in the case of *Missouri v. Illinois*, 180 U. S., 208; 200 U. S., 496, this Court said:

> "Controversies between them arising out of public relations and intercourse cannot be settled either by war or diplomacy, though, with the consent of Congress, they may be composed by agreement."

The making of a compact is a legislative act and not a judicial act

The quotations from the decisions of the Supreme Court follow the set up of the national Constitution. They recognize that subjects of compact which have to do with the property

rights of the several states are matters which can only be decided, and best be decided, by the legislative acts of the two states involved.

In *New York v. New Jersey and the Passaic Valley Sewage Commissioners,* 256 U. S., 296, this Court suggested, in dismissing the complaint of the State of New York (page 313):

> "We cannot withhold the suggestion, inspired by the consideration of this case, that the grave problem of sewage disposal presented by the large and growing population living on the shores of New York bay is one more likely to be wisely solved by co-operative study and by conference and mutual concession on the part of representatives of the states so vitally interested in it, than by proceedings in any court, however constituted."

Control of the United States over terms of compact

The consent of the United States to agreements or compacts among the several states relating to interstate waters is of necessity limited to such interests as the United States has under the Constitution. When a navigable stream is affected or may be affected, or the navigable capacity of a stream is affected or may be affected, the interests of the United States attach, and the authority of Congress must be obtained to make the compact or agreement a valid one.

Policy as to compacts concerning water rights

The control of the waters of interstate streams by the states through which the stream flows has been recognized by Congress in a number of acts which have been passed relating to this subject. These acts have all recognized that the disposition or the allocation of the waters of interstate streams should be determined in the first instance by the legislatures of the states involved; and under our constitutional provisions any agreements or compacts entered into by the states must

be ratified and approved by the Congress of the United States. The following are some of the acts which have been passed by Congress, either authorizing interstate compacts concerning this subject matter or approving compacts already made.

Act of August 8, 1917 (40 Stat., 266, sec. 5). Minnesota and North and South Dakota authorized to make agreements for the improvements of navigation and control of floods on boundary waters and tributaries.

Act of April 8, 1918 (40 Stat., 515). Oregon and Washington, protection of fishing in the Columbia River, etc. (Agreement ratified.)

Act of July 11, 1919 (41 Stat., 158). New York and New Jersey, construction of tunnel under Hudson River; consent to agreements authorized by New Jersey and New York.

Joint Resolution of March 4, 1921 (41 Stat., 1447). North and South Dakota, Minnesota, Wisconsin, Iowa and Nebraska; jurisdiction over boundary waters; agreements authorized.

Act of August 19, 1921 (42 Stat., 171). Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming; apportionment of waters of Colorado River and its tributaries, agreement to be made by January 1, 1923, subject to approval by legislature of each state concerned, and by Congress.

Joint Resolution of September 22, 1922 (42 Stat., 1058). Kansas and Missouri, development of water works plans for Kansas City, Kans., and Kansas City, Missouri; agreement approved.

Act of January 29, 1925 (43 Stat., 796-798). Colorado and New Mexico; distribution of waters of LaPlatte River, compact approved.

Act of March 4, 1925 (43 Stat., 1268). Washington, Idaho, Oregon and Montana; apportionment of water supply of Columbia River and its tributaries; agreement to be made by January 1, 1927, subject to approval by legislature of each State and by Congress.

Act of March 8, 1926 (44 Stat., 195). Colorado and Nebraska; apportionment of waters of South Platte River; agreement approved.

Act of April 13, 1926 (44 Stat., 247, C. 129). Extension of time for agreement by Washington, Idaho, Oregon and Montana, under Act of March 4, 1925, to December 1, 1927.

Act of July 3, 1926 (44 Stat., 831, C. 754). Idaho, Wyoming, Washington and Oregon; apportionment of waters of Snake River; agreement authorized, subject to ratification by Congress.

Act of February 26, 1927 (44 Stat., 1247, C. 216). South Dakota and Wyoming; apportionment of waters of Belle Fourche and Cheyenne Rivers; agreement authorized by ratification of Congress.

Joint Resolution, March 3, 1927 (44 Stat., 1403, C. 382). Provisions of Act of March 4, 1925, Washington, Idaho, Oregon and Montana, as to apportionment of water supply of Columbia River and its tributaries extended to December 31, 1930.

Act of March 2, 1929 (45 Stat., 1502, C. 520). An Act granting the consent of Congress to compacts or agreements between the states of Colorado and New Mexico with respect to the division and apportionment of the waters of the Rio Grande, San Juan, Las Animas Rivers and other streams in which such states are jointly interested.

Act of March 2, 1929 (45 Stat., 1502, C. 521). Granting the consent of Congress to compacts and agreements between the States of New Mexico, Okla-

homa and Texas with respect to the division and apportionment of the waters of the Rio Grande, Picos and the Canadian or Red Rivers, and all other streams in which such States are jointly interested.

Act of March 2, 1929 (45 Stat., 1503, C. 522). Apportionment of the waters of the Cimarron River and all other streams in which the States of New Mexico and Oklahoma are jointly interested.

Act of March 2, 1929 (45 Stat., 1517, C. 538). An Act granting the consent of Congress to compacts or agreements between the States of Colorado, Oklahoma and Kansas with respect to the division and apportionment of the waters of the Arkansas River, and all other streams in which such States are interested.

Sovereign must consent to taking

Sovereign rights can only be divested by the voluntary act of the sovereign. This may be accomplished in a number of different ways under our form of government. So far as powers have been delegated to the United States, such rights as are necessary to carry into effect such powers have been transferred to the United States by the States. The ratification of the constitution effected the transfer. It was the voluntary act of the sovereign power of each State. Such act was that of the legislative branch of the government. It is the legislative branch which today must approve of all amendments to the Constitution which may seek to delegate further powers to the federal government.

The legislature of a state may also by appropriate action enter into agreement or compact with another state. But this agreement or compact must be approved by the legislatures of the states involved and by the legislative branch of the United States government. In no case is there any intimation that any department other than the legislative can so act.

Nowhere does it appear that the State of Connecticut has ever consented to the taking of any of the waters involved in this action.

In *Hudson Water Company v. McCarter*, 209 U. S., 349, it was said:

> "But is it recognized that the state, as quasi-sovereign and representative of the interests of the public has a standing in court to protect the atmosphere and the water and the forests within its territory, irrespective of the assent or dissent of the private owners of the land most immediately concerned."

And further—

> "It finds itself in possession of what all admit to be a great public good; and what it has it may keep and give no one a reason for its will."

In *Georgia v. Tennessee Copper Co.*, 206 U. S. 230, 237, 238, this Court said:

> "This is a suit by a state for an injury to it in its capacity of quasi-sovereign. In that capacity the state has an interest independent of and behind the titles of its citizens, in all the earth and air within its domain. It has the last word as to whether its mountains shall be stripped of their forests and its inhabitants shall breathe pure air. It might have to pay individuals before it could utter that word, but with it remains the final power . . . . Some peculiarities necessarily mark a suit of this kind. If the state has a case at all, it is somewhat more certainly entitled to specific relief than a private party might be. It is not lightly to be required to give up quasi-sovereign rights for pay, and, apart from the difficulty of valuing such rights in money, if that be its choice, it may insist that an infraction of them shall be stopped. The states, by entering the union, did not sink to the position of private owners subject to one system of private law.

> This court has not quite the same freedom to balance the harm that will be done by an injunction against that of which the plaintiff complains that it would have in deciding between two subjects of a single political power. Without excluding the considerations that equity always takes into account, we cannot give the weight that was given them in argument to a comparison between the damage threatened to the plaintiff and the calamity of a possible stop to the defendant's business, the question of health, the character of the forests as a first or second growth, the commercial possibility or impossibility of reducing the fumes to sulphuric acid, the special adaptation of the business to the place . . . . . If any such demand is to be enforced this must be, notwithstanding the hesitation that we might feel if the suit were between private parties, and the doubt whether, for the injuries which they might be suffering to their property, they should not be left to an action at law."

We think it proper to state here that as a result of this decision the defendant company applied modern science to its business and perfected a workable and satisfactory plan. In this case, the action of this Court in granting the injunction stimulated the necessity which is "the mother of invention." The defendant did what we claim Massachusetts should now do, employ the scientific methods which are available.

XIV CONCLUSION

It is respectfully contended that the Complainant has shown that the proposed diversion of water from the Ware and Swift Rivers, as provided in the Massachusetts legislation, existing when this action was instituted, is of sufficient importance to cause the War Department to restrict the taking of these waters in the interests of navigation.

This proposed taking is of equal importance to other interests represented by the State of Connecticut, in its own

right as a riparian owner on the Connecticut River, as trustee for the public in maintaining the use of the waters of the River for navigation and fishing, as *parens patriae*, representing the general welfare of its people and in the interests of their health and comfort as well as its interests as a sovereign desiring to protect and conserve its natural resources.

It is conceded by the Special Master that damage will be inflicted by the proposed diversions as to both power and agriculture and we believe that our injury is not limited to these two factors but extends to navigation and fish life.

We believe that there is a decided distinction between injury and damage. This is not a claim for damages but a bill to enjoin the infraction of a property right. This property right has been recognized in both Connecticut and Massachusetts since their formation and should not be lightly discarded.

The claim of the Commonwealth of Massachusetts is that a great and serious emergency and necessity has arisen which is of sufficient gravity to justify its conduct in permanently removing water from the flow of an interstate stream in such manner and in such quantities as to destroy the plaintiff's right to the water and prevent it from having a like use of the same. Certainly such a claim warrants careful consideration and should demand that the necessity and emergency should be of "serious magnitude" and should be established "by clear and convincing evidence" by the State advancing it.

We confidently feel that this burden has not been sustained. Instead of the absolute lack of available supplies and the opportunity of a comprehensive development, a definite plan for a water supply development which will furnish as much water as can be developed on the Ware and Swift Rivers has been submitted by the designing engineer of the Metro-

politan Water Supply Commission. This confirms the many reports of the country's best engineers during the past half century and the independent investigations of the complainant's experts.

Under these circumstances the Complainant claims that the time has not yet arrived, nor have the conditions warranting such change in policy and law been shown to exist, and until they do, the two states should be left in *statu quo* and the injunction prayed for granted.

Respectfully submitted,

BENJAMIN W. ALLING,
Attorney-General,
State of Connecticut.

ERNEST L. AVERILL,
Deputy Attorney-General.

BENEDICT M. HOLDEN,
Special Counsel.

FILE COPY

Office Supreme Court
FILED
DEC 29 1
CHARLES E. HUGHES

In the Supreme Court of the United States

OCTOBER TERM, 1930

Original No. 12

STATE OF CONNECTICUT

v.

COMMONWEALTH OF MASSACHUSETTS

IN EQUITY

REPLY BRIEF FOR THE COMPLAINANT

BENJAMIN W. ALLING,
Attorney-General of the State of Connecticut.

ERNEST L. AVERILL,
Deputy Attorney-General.
BENEDICT M. HOLDEN,
Special Counsel.

THE CASE, LOCKWOOD & BRAINARD CO.
HARTFORD, CONN.

In the
Supreme Court of the United States

OCTOBER TERM, 1930

Original No. 12

STATE OF CONNECTICUT

v.

COMMONWEALTH OF MASSACHUSETTS

IN EQUITY

REPLY BRIEF FOR THE COMPLAINANT

BENJAMIN W. ALLING,
Attorney-General of the State of Connecticut.

ERNEST L. AVERILL,
Deputy Attorney-General.
BENEDICT M. HOLDEN,
Special Counsel.

In the
Supreme Court of the United States

COMPLAINANT'S REPLY BRIEF

Massachusetts, in its brief on file, claims that the issue in the case at bar:

> "calls for the application of international law principles of the same sort as those which controlled the decision of the International Commission which approved the application of the City of Winnipeg for permission to divert water from a tributary of the Lake of the Woods, an *international* water like the Connecticut River."
>
> (Brief of Massachusetts, p. 104.)

It asks the acceptance of a stated order of precedence among the various uses for waters:

> "(1) Uses for domestic and sanitary purposes;
> "(2) Uses for navigation, including the service of canals for the purposes of navigation;
> "(3) Uses for power and for irrigation purposes."
>
> (Brief of Massachusetts, p. 117.)

The claim that the use of water for domestic purposes should be first in order of priority is sound. Such use should not be exclusive but it should be given first consideration by both states, and the adoption of this rule and its application to features of this case was urged in argument to the Special Master by the complainant state. Consideration of this principle is urged by Massachusetts in order to meet an existing necessity for the further development of a water supply for Boston and vicinity. The necessity for further development of a water supply is conceded but we do not agree that the Connecticut watershed must be the objective. At to the manner in which uses of natural streams may be enjoyed in states adopting the common

law similar to that which prevails in Massachusetts and Connecticut, it is elemental that the use must be made in such manner as not to injure or damage the rights of riparian owners to a reasonable use and enjoyment of the same water.

The rule of riparian use necessarily has its roots in the doctrine of equality of rights. And wherever it is possible to do so the courts will ensure such an equitable division of the water as to permit a use which does not cause damage to or prevent a full and lawful use by lower riparians. Without regard to the common law or the theory of equitable division, Massachusetts made its plans and proceeded along the lines of carrying them into effect for the purpose of taking a quantity of water from tributaries of an interstate stream, which plans, if unchecked, would have interfered with and injured navigation. The original bill filed in this court complains of the action to be taken as outlined in the Massachusetts legislation. The War Department has found that unless the original plans of Massachusetts were modified, navigation would be injured.

Now Massachusetts indicates in brief and by statements of counsel that it will observe the first step in obedience to the doctrine of equitable division by conforming to the suggestions of the War Department. Counsel cannot bind Massachusetts, and unless this court acts upon the admissions contained in the Massachusetts brief, and by decree safeguards navigation as has been suggested by the War Department, we fail to see the remedy in the event that Massachusetts should subsequently see fit to change its mind and adhere to its original plan.

In the brief of Massachusetts Upon Complainant's Exceptions to the Report of the Special Master (page 22), it is stated:

> "The Special Master was correct in ruling that the principle of 'equality of right' controlled the use of the

> Connecticut River by the states through which it flows. Massachusetts is entitled to make a reasonable use of the waters of the Connecticut River, *including the right to appropriate permanently an equitable portion of its waters.*" (Italics ours.)

No evidence was submitted in the case tending to demonstrate what constituted an equitable portion of the waters of the Connecticut River to which Massachusetts would be entitled to permanently appropriate rather than use and return to the stream.

The evidence before the Master was confined strictly to that tending to show the injuries suffered by Connecticut from diversions as proposed by Massachusetts, modified by the restrictions of the Secretary of War. The Master stated, in the course of the hearings, that in his mind that was the question before him. He did not exclude, but he frowned upon, evidence which Connecticut offered tending to show the effect of the diversion of water from rivers in the Connecticut valley other than the Ware and Swift. In the report of the Special Master, he found this evidence to be immaterial. In the same report, there is no weight given to the evidence which Connecticut submitted of the effect of the diversions as proposed by the Massachusetts legislation without modification by the restrictions of the Secretary of War. The case therefore was strictly confined to the effect of the diversions as proposed by Massachusetts and as modified by the restrictions of the Secretary of War. It was based upon the theory that Massachusetts would take all the available water at times of low flow in excess of that needed to maintain present navigability.

Connecticut claimed that it is contended in Connecticut's brief upon the exceptions to the report of the Special Master, that damage was shown to the following interests in the State of Connecticut:

1. Navigation
2. Pollution
3. Agriculture
4. Power
5. Fish Life

The brief of Massachusetts, upon Complainant's exceptions to the report of the Special Master, and the Report of the Special Master concede that there will be some damage to agriculture but that the damage will be small; also that damage will be done to the power project on the Connecticut River at King's Island, for which a federal permit has been issued, but that compensation in money damages can be made for the rights destroyed.

With respect to the other three items, Massachusetts does not concede any damage but bases its claim upon the theory that at all times of low flow there will be an increase instead of a diversion, a position which is directly contrary to the condition which will prevail during forty percent of the period of low flow. Connecticut, in its brief, has stated its claim to damage on the other three items and the court must decide by the weight of evidence and the strength of the relative claims of the two parties.

If the evidence before the Master of the diversion proposed by Massachusetts under their legislation, without the modification of the restrictions of the Secretary of War, had been considered by him there is no question that the Master would have found himself, as did the Secretary of War in passing upon the application of Massachusetts to divert from the Swift River, "unwilling to admit that the appropriation of water . . . . . might not have an appreciable effect on the navigable capacity of the Connecticut River." It is Connecticut's claim that the case was tried on a specific degree of diversion and that this diversion resulted in a specific degree of damage

to various interests in Connecticut. There can be no question that diversion under the Massachusetts legislation, resulting in the abstraction of slightly larger quantities of water from the tributaries of the Connecticut River would have resulted in greater damage to the Complainant state.

It is conceded that the War Department's modification of the diversion was a step toward the amelioration of the damage to Connecticut, but a step which did not effect a complete elimination of that damage.

Massachusetts brief, (page 50), concedes that variations from averages in the matter of stream flow will account for a large number of days in the average year when no protection to navigation is afforded by the modifications of the Secretary of War.

The "occasional unusual day" (Massachusetts brief, page 51), is not supported by the evidence in the case. Massachusetts is referring to Exhibit C-41, which shows that 30 days out of 67 days the War Department's modifications failed to provide protection for navigation at times of low river stages. This cannot be called an "occasional unusual day."

The case is one of *degree of diversion*. No one will deny that a greater diversion will cause a greater damage. The works which Massachusetts is projecting westward from the Metropolitan District and constructing in the valley of the Swift River is sufficient for the diversion of water from nearly a thousand square miles of drainage area. Connecticut appealed to the Master to take cognizance of the size of these works, but he refused. In *United States v. Sanitary District*, 266 U. S., 405, Justice Holmes, writing the opinion of the court, said that since the Act of the State of Illinois created the Chicago Sanitary and Ship Canal of a capacity of 600,000 cubic feet per min-

ute, he would consider that that was the quantity of water which the Chicago Sanitary District was diverting or would divert and against which injunction should issue.

Connecticut has never pleaded in this case that it would be an unwilling party to an equitable use of the benefits of Connecticut River waters. On the contrary, Connecticut has attempted to show by evidence in the hearings that a conservation of water was one of the State's adopted policies. In coming into this Court, however, to insure the fulfillment of this policy, Connecticut came in the belief that it would be necessary to support its claim upon established principles of law, the common law of riparian rights.

The attention of the court is respectfully directed to Exhibit "C-25-a" and "C-25-b," which show specifically that the modifications of the War Department were a step in the right direction, but which show at the same time what a short step that was and what a much greater difference a little longer step in the same direction might have meant. These two exhibits show that the modifications of the Secretary of War affected only the stages at Hartford of 1 and 2 feet and that all stages over 2 feet remain unchanged as to quantity of water diverted.

It is contended by Connecticut that before any ruling can be made upon the equitable use of the waters of the Connecticut River, some inquiry should be made into the effect of extending the modifications of the Secretary of War to higher flows such as those occurring at stages of 3 and 4 ft.

From Exhibit "C-25-a," the diversion at 3-foot stage at Hartford is 125 cubic feet per second for 15 percent of the time. This quantity of water amounts to about 12 million gallons per day average throughout the year, an insignificant amount of water in the total yield which Massachusetts expects

to obtain by the proposed diversion and yet a sufficient amount of water if properly stored in the proposed reservoir and released at times of stringency to effect a noticeable decrease in the amount of injury to be suffered by Connecticut as a result of the diversion.

It is contended by Connecticut that no equitable use theory can be applied to the waters of the Connecticut River without consideration of these factors. The modifications of the Secretary of War are eloquent evidence that this diversion, and particularly the effect of this diversion, is primarily a question of degree. The Secretary of War found that if the diversion were carired out under the Massachusetts legislation, he would be unwilling to admit that there might not be a serious diminution of the navigable capacity of the Connecticut River. He proceeded to impose modifications which he said would change the diversion so that it would have no effect upon the navigable capacity of the navigable portion of the Connecticut River. Yet the difference between the amount of water diverted under the Massachusetts legislation and under the same legislation as modified by the restrictions of the Secretary of War is only 13/100 of 1 percent of the total flow of the Connecticut River at the Massachusetts-Connecticut State Line.

The restrictions of the Secretary of War only apply at stage of 2.1 or below at Hartford, while the entire amount of water taken when the Hartford gauge stands at 3.5 feet or below is 600 million cubic feet per year, or .1 of 1 percent of the annual average flow.

It is evident from the defendant's brief that Massachusetts acknowledges a desire to use the waters of the Connecticut River watershed for a non-riparian use and for a use which it feels it cannot justify under any known rule of law. To overcome this difficulty it suggests that it is possible to either extend

present rules of law to convert what has always been considered a non-riparian use into a riparian use or authorize a conceded non-riparian use through the judicial power of government upon the payment of compensation.

As to the first principle there should be no thought of compensation. If conditions and circumstances warrant the inclusion of their proposed use of water in the category of "reasonable use", the element of damage should be removed from consideration. In equity we would then have a situation recognized as an equitable principle, of *damun absque injuria*.

On the other hand if the idea is to seek from a court of equity relief upon the payment of damages then we cannot escape the real issue which is, can or should the judicial branch of government be asked to indirectly substitute its decree for what ordinarily is considered as the province of the legislative branch of government in the exercise of the power of eminent domain.

Whichever principle is to be considered, Massachusetts offers as its reason for the adoption of either rule an existing necessity and emergency for the further development of a water supply for Boston and vicinity. This necessity and emergency is also conceded. Not that the Connecticut watershed must be the objective but that *some source* must be developed.

A number of sources can be developed. For the purposes of this argument we will remove from consideration any plans suggested by Connecticut and confine our attention to those proposed by engineers representing the Commonwealth of Massachusetts and the Metropolitan District.

These sources are four in number. *First*, increased yield from present sources of supply. *Second*, existing sources *avail-*

able but undeveloped. Third, the Merrimack River. *Fourth*, a combined Merrimack and Ipswich River development.

As to the *first*, for a number of years, and in at least two official reports of engineers of national reputation (Ex. C-1 and C-3) it has been demonstrated that too much water is being used for purification purposes with a resulting loss and waste of water during the season of plenty. It has been stated officially to the Great and General Court that instead of the 179,000,000 gallons per day which should be the yield of present district sources, about 147,000,000 gallons per day is considered as the safe yield. This difference of 32,000,000 gallons per day is utilized to purify waters which the general public is led to believe do not need purification and could be made available for consumption by the installation of filters designed to accomplish the result now obtained by excess storage.

As to the *second*, the agreed statement as to Massachusetts' claim of available supplies (Joint Summary of Evidence, p. 160) we find 85,000,000 per day *available but undeveloped* (70 million gallons per day Ipswich and 15 million gallons per day Assabet). These supplies have been considered as available for many years. (Exhibit "C-1," "C-2" and "C-3") but they still remain *undeveloped*.

The *third* source of supply has always been claimed as an almost inexhaustible supply since 1895 (Exhibit "C-1" and "C-2"). It has always been conceded to be usable and safe if developed by modern filtration methods. It is now in use by the City of Lawrence, Massachusetts, and with filtration alone produces a supply which, according to the Board of Public Health of Massachusetts, compares not only favorably with present Metropolitan District supplies, but slightly better. (Joint Summary of Evidence, p. 203, 204).

The *fourth* supply was prepared by the designing engineer of the Metropolitan Water Supply Commission, and introduced in evidence in this case after consultation with the several expert engineers representing Massachusetts. It is known as the Kennison plan from its author. It is designed to utilize the Ipswich and Merrimack Rivers and to produce as much water as the combined Ware and Swift plan (Joint Summary of Evidence, pp. 245, 246.) It has the advantage of adding to the previously suggested treatment by filtration the additional safeguard of storage.

With all these sources suggested by Massachusetts' experts still undeveloped, the claim of Massachusetts as set forth in the Answer that it can not obtain a supply of water anywhere within the Commonwealth except from the Connecticut valley, fails; in fact, it is unequivocally disproved although the burden was upon Massachusetts to sustain that affirmative allegation.

As to some of these sources of supply, especially the last one, it is claimed that the rivers in question are now polluted, that there are necessary requirements for process water for manufacturers and needed water for power purposes involved. It might be a sufficient answer to these claims to remind Massachusetts of their first premise, that the highest use of water should be for domestic use, a principle to which we readily agree.

If some of the sources of supply are polluted, Massachusetts is responsible for the condition which exists, and which can exist only so long as Massachusetts permits it to do so.

It can control the purity of the waters within its borders, and if it declines to exercise its powers in this respect it cannot deprive Connecticut of the use of natural resources to take the place of what it is losing because of its own carelessness, negligence or selfishness.

> "It is a question of the first magnitude whether the destiny of the great rivers is to be the sewers of the cities along their banks or to be protected against everything which threatens their purity. To decide the whole matter at one blow by an irrevocable fiat would be at least premature." (Missouri *v.* Kansas, 200 U. S., 521, 522.)

That present conditions can be remedied is demonstrated in the testimony of Dr. Goodnough, head of the Department of Public Health of Massachusetts, who testified (Joint Summary of Evidence, p. 223) that one of the inevitable results of a decree of this court refusing to Massachusetts the waters of the Ware and Swift Rivers and the necessary alternative of using the Merrimac River as a water supply would be the immediate construction of a sewer to remove the Massachusetts pollution from the Merrimac River or the construction of sewerage disposal plants to accomplish the same result.

Assuming, however, that Massachusetts and the Special Master are correct in saying that Eastern Massachusetts should not be compelled to utilize these available sources of supply, especially those in a present badly polluted state, and that the necessity or emergency should be now met by permitting the Ware and Swift waters to be taken, what is to be the nature of the taking? Is it to be of a temporary character to relieve the present necessity or emergency? Is it to be only until such time as the waters in Eastern Massachusetts can be cleaned up and made ready for use? Or is it a permanent taking, the forerunner of further invasions of the Connecticut watershed?

The claim of necessity and emergency urged as the basis for the exercise of equitable relief might suggest a temporary expedient until Massachusetts' house can be put in order but the finding of the Special Master is discouraging. He finds no disposition upon the part of Massachusetts to remedy present conditions and concludes that the future will be blacker than the present.

If such be the case, it is asking a good deal of the Court to relieve an emergency so that the supplicant may make permanent a condition which equity should insist be adequately cared for within a reasonable time as a condition precedent to the granting of the relief sought.

If Massachusetts is permitted to take the waters of the Ware and Swift Rivers, such taking should be accomplished with the least possible damage to Connecticut and its citizens —the ideal would be to so arrange the diversion that no damage would result.

If the "equitable use" of the stream means anything at all, it means so using the waters in the upper state that it will not interfere, or will interfere as little as possible, with the use in the lower state. The major uses of the waters of the Connecticut River in the State of Connecticut will occur primarily at times of low flow and at times of high flow.

Navigation—The War Department took as its critical point 2.1 feet on the Hartford Gauge. The uncontradicted evidence shows that due to the fact that the project has never been carried out, the critical depth is "from three to four feet", (Complainant's brief, page 84); that during this time, every drop of water that can be obtained is absolutely essential, while above that amount the value of additional water decreases as far as navigation is concerned, although it is more "economical" to navigate the river at flows higher than four feet.

Power—The record shows that water for power is desirable at all stages of the river up to the point where the flow of the stream would be equivalent to 50,000 horsepower and any diversion above that point would not adversely affect power development on the Connecticut River. (The record is silent as to either the gauge height or the flow of the river equivalent to

50,000 horsepower.) The record does show, however, that by proper regulation of the flow of water, namely, storing it during times of high flow and releasing additional quantities under proper regulation at *all* times when there is an extreme deficiency of power, that such reliability of increases in stream flow will decrease the steam power plants required and could be made to compensate in kind for the loss in power due to diversions by furnishing water at other times of the year when the power is more valuable.

Agriculture—The Record shows that the only use made of the water of the Connecticut River for agricultural purposes is that of the flood waters in inundating the land. This inundation occurs when the height of the Hartford gauge is 16 feet or over, and therefore there will be no damage to agriculture by any diversions except when the gauge at Hartford is 16 feet or above.

Pollution and Fish Life—In regard to pollution and fish life, both of these are affected by diversions at low flow and also at high flow. The low flow is needed for maintaining the oxygen conditions when the river is in such shape that danger to fish life or nuisance is likely to occur. Also, high flood flows are valuable in flushing out the river and pushing fresh water into the Sound.

Therefore, it would appear that if diversions were limited to the time when the Hartford gauge is between 4 feet and 16 feet, little or no damage will be done to navigation, agriculture, pollution and fish life. Furthermore, any damage which occurs to water power could be lessened or completely eliminated by proper regulation for the release of stored waters with regularity and assurance during times of extreme dry weather, so as to reduce the steam standby power required and increase the water power available at such times.

Such regulation will not affect the Massachusetts project. For example, Dr. Winsor testified that under the restrictions of the War Department, only 6 per cent of the total diversions would take place when the Hartford gauge was 3½ feet or less. This would equal about 14 million gallons a day. Furthermore, it was never contemplated by any engineers that the Ware and Swift would be so developed that it would affect the Hartford gauge during such times. The recommendations in House Document 1550 (Complainant's Exhibit "C-1," p. 174) referred to diversions of "flows in excess of 1.2 cubic feet per second per square mile of watershed." As shown in Complainant's Exhibit "C-25," this is between 4 and 5 feet on the Hartford gauge (4 feet being 1.09 and 5 feet being 1.48 cubic feet per second per square mile).

The record shows that there is an average of 13 days a year when the flood flow of the river will be in excess of 16 feet on the Hartford gauge. This is the period of time when agriculture receives all the benefit from flood waters. Massachusetts could have found and have offered to take the flow in excess of 1.2 cubic feet per second per square mile of watershed, which would be between four and five feet on the Hartford gauge, and refrained from taking any water when the flow was above 16 feet on the Hartford gauge on the average of 13 days per year, and might not have precipitated this controversy.

If this court should extend the doctrine of riparian use to include equitable division, it will undoubtedly take into consideration: (a) the supply of water in Eastern Massachusetts: (b) its condition and the length of time in which Massachusetts can, by the exercise of reasonable prudence and diligence, clean up these streams; (c) Apportionment to Massachusetts such volume of water of the Connecticut River as will take care of the needs of Massachusetts for the next thirty or forty years, during which time it can clean up the eastern resources;

(d) The possibility of effecting such an apportionment with little or no damage to Connecticut or its citizens. By doing this it gives Massachusetts what Connecticut has always been willing it should have, a supply of water which will make a water famine or shortage impossible during the period of time necessary for it to make available the resources at its door.

Any other course would be to stamp with the seal of approval of this Court Massachusetts' conduct in maintaining the streams in eastern Massachusetts as open sewers, and pointing to the Connecticut valley watershed as the only source of future additional supply, with the consequences that the damages will ever be increasing, the encroachments growing from time to time, and a definite check will be placed upon any effort to develop or improve navigation on an interstate stream.

The Court will not be unmindful of the tendency on the part of Congress to further develop navigation, i.e. to increase the navigability of streams. This can not be done if Massachusetts is permitted to permanently remove practically all of the water which is critically necessary to maintain navigation at its lowest point for many months in the year.

It is a significant and apparent fact that during these months the City of Hartford and other cities along the Connecticut River would be denied the right to take any water whatever from the river because if they did so they would lower the stage of the river below that which the War Department has indicated must be maintained in the interests of navigation.

The Court having taken jurisdiction of this cause, we feel that the decree of the Court should settle not only this controversy but be informative as to the rights of the states, and we respectfully ask that if the Court should be impressed with the needs of Massachusetts to immediately secure some addi-

tional water for the Metropolitan District it should limit the taking and clearly indicate that further taking will not be permitted. We feel that this Court can in its decree indicate a future course for Massachusetts to pursue in cleaning up the vast resources which are in the eastern watershed and that such a decree will not work injustice or hardship on either party but will result in lasting benefit and good to the situation as a whole.

Respectfully submitted,

BENJAMIN W. ALLING,
Attorney-General,
State of Connecticut.

ERNEST L. AVERILL,
Deputy Attorney-General.

BENEDICT M. HOLDEN,
Special Counsel.

FILE COPY

FILED
MAR 5 1928
CLERK

In the
Supreme Court of the United States.

6586
58

OCTOBER TERM, 1927.

ORIGINAL NO. 14. 12

IN EQUITY.

STATE OF CONNECTICUT

v.

COMMONWEALTH OF MASSACHUSETTS.

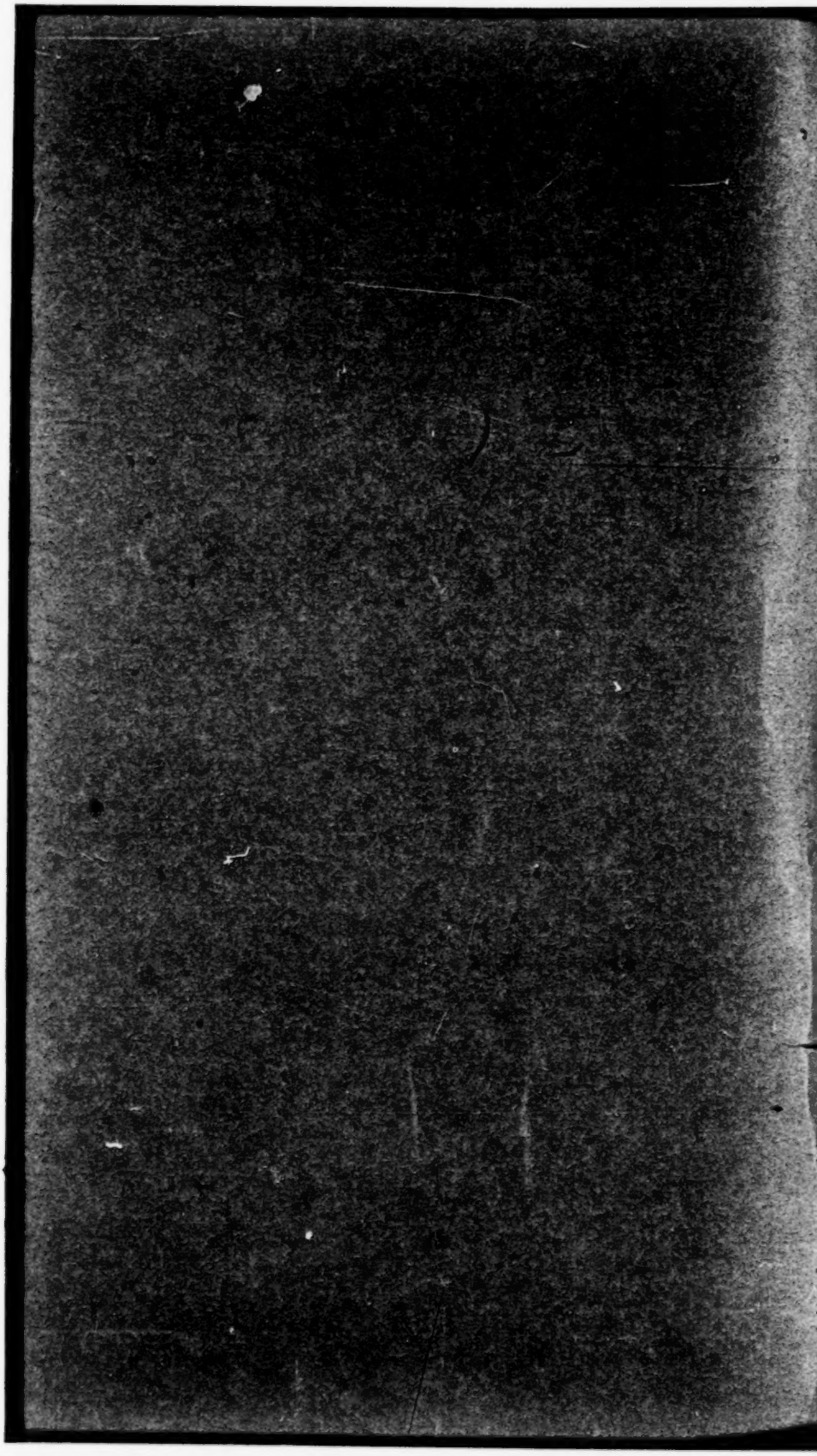
ANSWER OF DEFENDANT THE COMMONWEALTH OF MASSACHUSETTS.

ARTHUR K. READING, *Attorney General*
Of the Commonwealth of Massachusetts,

BENTLEY W. WARREN,
Special Assistant Attorney General
Of the Commonwealth of Massachusetts,
Attorneys for the Defendant.

Of Counsel,

GERALD J. CALLAHAN,
R. AMMI CUTTER,
Assistant Attorneys General
Of the Commonwealth of Massachusetts.



In the
Supreme Court of the United States.

OCTOBER TERM, 1927.

ORIGINAL NO. 14.

IN EQUITY.

STATE OF CONNECTICUT

v.

COMMONWEALTH OF MASSACHUSETTS.

MOTION FOR LEAVE TO FILE ANSWER.

And now comes the defendant in the above-entitled case, in response to the precept and subpœna issuing to it out of this Honorable Court, and hereby moves for leave to file the answer hereunto attached to a bill of complaint exhibited against it, the said defendant, by the State of Connecticut.

ARTHUR K. READING,
Attorney General
Of the Commonwealth of Massachusetts,

BENTLEY W. WARREN,
Special Assistant Attorney General
Of the Commonwealth of Massachusetts,
Attorneys for the Defendant.

Of Counsel,

F. DELANO PUTNAM,
GERALD J. CALLAHAN,
R. AMMI CUTTER,
Assistant Attorneys General
Of the Commonwealth of Massachusetts.

In the

Supreme Court of the United States.

OCTOBER TERM, 1927.

No. 14. ORIGINAL. IN EQUITY.

THE STATE OF CONNECTICUT,
Complainant,

v.

COMMONWEALTH OF MASSACHUSETTS,
Defendant.

ANSWER TO THE BILL OF COMPLAINT.

And now comes the Commonwealth of Massachusetts by Arthur K. Reading, its Attorney General, and for answer to the bill of complaint heretofore filed by leave of court by the State of Connecticut says as follows:

1. The defendant admits the material allegations of fact, if any such there be, contained in the first paragraph of the bill of complaint, set forth on page one of the printed bill.

2. Answering the second paragraph, set forth on page two of the printed bill of complaint, the defendant admits that the State of Connecticut was one of the "Thirteen Original Colonies" and that said State was a party to the original adoption of the Constitution of the United States; that said State, through its duly constituted authorities, has exercised sovereign power under said Constitution over such lands, waters, and other properties as are now comprised within the territorial limits of the State of Connecticut since the adoption of such Constitution, but

the defendant says that such sovereign power of the State of Connecticut is subject to the superior power of the Government of the United States in so far as regulatory power is given to the Government of the United States under the Constitution of the United States. As to whether or not said State has succeeded to all the rights, properties, duties, and obligations created by charter granted in 1662 by King Charles the Second, King of Great Britain, the defendant is ignorant and says that if the allegations to that effect are material allegations of fact it can neither affirm nor deny the same, but leaves the complainant to prove the same if and in so far as they may be material. The defendant denies that a great portion of the Connecticut River is included within the territorial limits of the State of Connecticut and that all of the portion of said river actually so included is navigable.

3. Answering the third paragraph set forth on pages two and three, of the printed bill of complaint, the defendant admits that it was one of the original Colonies and was a party to the Constitution of the United States; that at the time of the adoption of said Constitution the said defendant was a body politic organized for the usual governmental purposes and exercising sovereignty over the territory within its then defined limits, which included a portion of the Connecticut River and a portion of many of the tributaries of said river, including those specifically set out in said third paragraph of the bill of complaint. The defendant denies that the Swift River, the Ware River, and the Quaboag River flow directly into the Connecticut River, but avers that the Swift River flows into the Ware River about seven-tenths (7/10) of a mile above the village of Three Rivers in the town of Palmer, at which village the Quaboag flows into the joint waters of the Ware and Swift rivers, forming as a result of said con-

fluence a river known as the Chicopee River, which flows in a general westerly direction about seventeen miles emptying then directly into the Connecticut River. The defendant denies that the waters of all or any of said tributaries are necessary to maintain and preserve the flow of said Connecticut River.

4. Answering the fourth paragraph, set forth on page three, of the printed bill of complaint, the defendant denies each and every material allegation of fact therein contained, if any such there be, except that the defendant admits that the Commonwealth of Massachusetts has exclusive control and power of regulation of all water within its territorial limits and that such sovereignty over the waters within the territorial limits of the said State of Connecticut and of the Commonwealth of Massachusetts as may be exercised by the respective State and Commonwealth is subject to such rights as have been conferred upon the United States of America by the Constitution of the United States in the interests of interstate commerce and for the protection of the navigability of streams, wherever the same may be situated. The defendant further says that if the law of the State of Connecticut with respect to the control and power of regulation of the waters within the territorial limits of said State is here material, the defendant is ignorant of the same and leaves the complainant to prove the same in so far as it may be material. And further answering the defendant says that by the law both of the Commonwealth of Massachusetts and of the State of Connecticut owners of riparian lands are entitled to make reasonable and equitable use of the waters of streams flowing by or through their lands providing that such use is not inconsistent with a similar reasonable and equitable use of the said stream by lower riparian owners.

5. Answering the fifth paragraph, set forth on pages three and four, of the printed bill of complaint, the

defendant admits that the United States of America, acting under the authority of the Constitution of the United States, by virtue of various acts of the Congress of the United States, has assumed the care and control of navigable rivers and has placed the greater portion of the duty of exercising such control in the War Department of the United States Government and the office of the Secretary of War; but the defendant denies that any acts and things which have been in fact done or which are in fact planned by the Commonwealth of Massachusetts, complained of in said bill of complaint, constitute in any way an interference with interstate commerce by affecting the navigability of the said Connecticut River, or that, in so far as concerns any rights or interests of the State of Connecticut or of the people thereof, there is any necessity that permission should be obtained from the War Department and the office of the Secretary of War of the United States before any of the acts and things heretofore actually done or hereafter actually contemplated to be done by the Commonwealth of Massachusetts, referred to in said bill of complaint, may be lawfully done by the Commonwealth of Massachusetts, but the defendant says that whether or not such permit is necessary rests solely within the jurisdiction of Congress and of the War Department, in so far as the powers of Congress have been delegated to that department. The defendant admits that at the time of the preparation of this answer permission from the War Department or from the office of the Secretary of War of the United States had not been obtained to do any acts actually done or contemplated to be done by the Commonwealth of Massachusetts, referred to in the bill of complaint, for which any permit may be by law required, but the defendant avers that it has filed with the Secretary of War applications for permits to make certain diversions of the waters of the Swift River and of the Ware River,

which contemplated diversions are hereinafter more fully described. The defendant denies that any diversion of the waters of any other river in the watershed of the Connecticut River is contemplated or planned by it. The defendant denies each and every other material allegation of fact in said fifth paragraph of the bill of complaint, if any such there be.

6. Answering the sixth paragraph, set forth on page four, of the printed bill of complaint, the defendant admits, in so far as it is material, that the Connecticut River rises in the Connecticut Lakes of northern New Hampshire and flows southward between New Hampshire and Vermont and across Massachusetts and Connecticut into Long Island Sound; that it is the largest river in New England and that it is about 345 miles long; that it drains an area of approximately 11,345 square miles, of which approximately 2720 are within the Commonwealth of Massachusetts and approximately 1430 in the State of Connecticut; and that it falls about 1900 feet from its headwaters in the Connecticut Lakes to Long Island Sound. The defendant avers that although available statistics indicate that the mean annual precipitation in the Connecticut River Valley is about 40 inches ranging from about 45 inches at Hartford to about 35 inches in the upper portions, the inadequacy of records in the higher portions of the watershed which are generally snow-covered for a considerable period of the year, makes it probable that the rainfall in the upper portions of the area is greater than the statistics indicate. The defendant, if it be material, is ignorant as to whether the United States Government has found that the Connecticut River is a navigable stream from Springfield, Massachusetts, to Long Island Sound and leaves the petitioner to prove the fact if material, but the defendant admits that the portion of said river below Hartford is to some extent

in use as a means of transportation for passengers and freight. The defendant is ignorant as to whether a line of steamships carrying passengers between Hartford and New York makes two trips daily on said river, or as to whether the citizens of Connecticut and the industries throughout the Connecticut Valley and elsewhere receive coal, merchandise, and other freight by means of the Connecticut River, or as to whether there is a large number of sloops, yachts, and pleasure craft maintained and used upon said river; and the defendant leaves the complainant to prove all or any of these facts in so far as the same may be material. Each and every other material allegation of fact, if any such there be, contained in the sixth paragraph of the bill of complaint is denied by the defendant.

7. Answering paragraph 7 set forth on pages four and five of the printed bill of complaint, the defendant denies each and every material allegation of fact contained in said paragraph, except that it admits that the Ware River rises in the town of Westminster in Worcester County, flows southwesterly ten miles to New Boston, where it turns and flows northwesterly to Barre Falls, from which place it flows in a general southwesterly course to a point where it receives the Swift River, approximately seven-tenths of a mile northerly of the village of Three Rivers in the town of Palmer, and that the joint rivers then flow about seven-tenths of a mile to the said village of Three Rivers, where the joint rivers receive the Quaboag, which confluence forms the Chicopee River which flows in a direction approximately south of west to the city of Chicopee, where the Chicopee River enters the Connecticut River. The defendant admits further that the total distance from the source of the Ware River to the mouth of the Chicopee River is approximately sixty miles. The defendant avers that the total drainage area of the Ware River, from its source to its confluence with

the Swift River, is about two hundred and nineteen square miles, that the total drainage area of the Ware River above the point at which the diversion of certain flood waters is authorized by certain legislation of the Great and General Court of the Commonwealth of Massachusetts hereinafter mentioned and attached hereunto marked exhibit A, is only 98 square miles, and that even from this area only the diversion of certain flood waters as defined in the said legislation is authorized.

8. Answering the eighth paragraph, set forth on page five of the printed bill of complaint, the defendant admits the material allegations of fact contained in said paragraph.

9. Answering the ninth paragraph, set forth on page five of the printed bill of complaint, the defendant admits the material allegations of fact contained in said paragraph.

10. Answering the tenth paragraph, set forth on page five of the printed bill of complaint, the defendant denies that all the country drained by the Ware, Quaboag, Swift and Chicopee rivers is hilly, but admits that a large portion of such country drained by the said tributaries of the Connecticut River is hilly. The defendant admits that the average slope of the said various tributaries is about fifteen feet to the mile. The defendant admits that many lakes and ponds drain into the Connecticut River through small tributaries and that the minimum flow of said river is well sustained by natural drainage and filtrations. Each and every other material allegation of fact, if any such there be, contained in the tenth paragraph of the bill of complaint is denied by the defendant; and further answering, the defendant says that by the Constitution of the United States jurisdiction to determine questions affecting navigability of navigable waters is committed to Congress and to such officials as Congress may designate, and that Congress has so designated the

officials of the War Department and has delegated the administration of its powers of supervision of navigable streams to said officials and that the determination of Congress or said officials of the War Department is conclusive as to whether or not the navigability of a navigable stream is affected adversely by any act complained of by the bill of complaint.

11. Answering the eleventh paragraph, set forth on page six of the printed bill of complaint, the defendant says that it is ignorant as to whether the State of Connecticut is the owner of the bed of the Connecticut River within the territorial limits of the State of Connecticut and leaves the complainant to prove the same in so far as it be material; and further answering, the defendant avers that no question of whether any act done or contemplated to be done by the Commonwealth of Massachusetts has an adverse or injurious effect upon the navigability of the Connecticut River is here relevant or material, the determination of such issues having been committed by the Constitution of the United States to Congress, which has delegated its administrative powers to the War Department and the Secretary of War. Each and every other material allegation of fact, if any such there be, contained in the eleventh paragraph of the bill of complaint is denied by the defendant.

12. Answering the twelfth paragraph set forth on page six of the printed bill of complaint the defendant is ignorant as to whether the State of Connecticut is the owner of a certain tract of land situated on the banks of the Connecticut River in the city of Middletown within said State, and is further ignorant as to whether there is a state hospital for the insane located upon said tract, and leaves the complainant to prove the same in so far as it be material. Each and every other material allegation of fact contained in said twelfth paragraph of the bill of complaint is hereby denied by the defendant.

13. Answering the thirteenth paragraph, set forth on pages six and seven of the printed bill of complaint, the defendant admits the duties of the State of Connecticut as *parens patriae*, but denies each and every other material allegation of fact contained in said paragraph; and further answering, says that no property or person situated or living in or having interest in the Connecticut Valley, so-called, is in any way injuriously affected by any acts and things done, contemplated to be done, or threatened to be done, by the Commonwealth of Massachusetts.

14. Answering the fourteenth paragraph, set forth on page seven of the printed bill, the defendant admits that the Connecticut River flows through a portion of the State of Connecticut, said portion of said State being commonly designated as a part of the Connecticut Valley, from Longmeadow near and south of Springfield, Massachusetts, to Saybrook, Connecticut, where it empties into Long Island Sound, which is an arm of the Atlantic Ocean. But the defendant denies that there is a vast area of watershed on either side of said river which has received any benefit from the flood waters of said river, but on the contrary the defendant says that said flood waters are in nowise of benefit to said watershed but cause great and immeasurable damage to the lands, which are at times covered by said waters. The defendant further denies each and every other material allegation of fact contained in said fourteenth paragraph of the bill of complaint. And further answering, the defendant says that no act or thing done or contemplated to be done by the Commonwealth of Massachusetts will in any way materially affect the flow of the Connecticut River or have any tendency to affect adversely the fertility of any land within the territorial boundaries of the State of Connecticut, but on the contrary the defendant alleges that all acts done

or contemplated to be done by the Commonwealth of Massachusetts will benefit the State of Connecticut in that they will afford a means by which the damages from excessive and unusual floods may be in part controlled and reduced by withholding the said flood waters from an area which otherwise would be covered with water and damaged. And the defendant further alleges affirmatively that according to certain plans for the storage, by the Commonwealth of Massachusetts of water in the valley of the Swift River, it will be possible, and it is the intention of Massachusetts to release a sufficient amount of water daily to maintain a reasonable flow in the Swift River and thus contribute to the maintenance of the flow of the Connecticut River itself. And further answering, the defendant says that under the legislation adopted by the Commonwealth of Massachusetts, so much of the waters of the Swift River as may be held back with the permission of the War Department of the United States will be stored by the Commonwealth of Massachusetts in the valley of the Swift River and will be in nowise diverted into any other place until such time as the said waters are actually required for use for drinking and other household purposes by the citizens and inhabitants of the Commonwealth of Massachusetts, at which time the waters will be transferred, as actually needed for such use, to reservoirs directly supplying the region in and about the city of Boston; that only the flood waters of the Ware River, as defined in said legislation, copies of which are hereunto annexed marked Appendix A, will be diverted by the Commonwealth of Massachusetts under the provisions of said legislation, so that no interference with, or diminution of, the flow of said last-named river during the drier seasons of the year will take place, such flood waters actually taken being in part stored in the Wachusett Reservoir and in part in a

reservoir to be constructed in the valley of the Swift River, to which reservoirs such flood waters of the Ware River actually diverted will be transferred by means of tunnels and conduits, and that such flood waters will be so diverted only for a supply of water for drinking, household, and other domestic and municipal uses of the 1,900,000 human beings living in the city of Boston and its environs.

15. Answering the fifteenth paragraph, set forth on pages seven and eight, of the printed bill of complaint, the defendant says that it is ignorant of the truth or accuracy of the material allegations of fact therein set forth and therefore leaves the complainant to prove the same in so far as they may be material, but the defendant denies the truth or the soundness of the conclusions reached in said paragraph as to the benefit to riparian lands resulting from the flooding thereof and the depositing of sediment thereon, as alleged in said paragraph.

16. Answering the sixteenth paragraph, set forth on page eight, of the printed bill of complaint, the defendant admits that the State of Connecticut is in part thickly populated, but avers that said State is also in part a rural community and sparsely settled; and the defendant further admits that the inhabitants of said State have large agricultural and industrial enterprises and interests in that area known as the Connecticut Valley; that the Connecticut Valley is drained by the Connecticut River; that beyond the borders of the State of Connecticut and for many miles within the territorial limits of the Commonwealth of Massachusetts there is a large watershed which is drained by the said Connecticut River; and that to some extent, both within Massachusetts and Connecticut, cities, towns, factories, and riparian owners discharge sewage, offal, and waste matter, but no offal in Massachusetts, in such manner that it is emptied into and carried away and disposed of by the waters of the

Connecticut River, but to what extent such drainage takes place the defendant is ignorant and leaves the complainant to prove the same in so far as it be material. And the defendant denies that such acts and things pertaining to drainage have been done necessarily by reason of the natural topography of the country, or that it is necessary because of such drainage that the natural flow of the Connecticut River or the flood waters thereof should remain undiminished and unimpeded, or that it is necessary, in the present state of development of scientific or hygienic disposition of such sewage, that such sewage, offal, and waste material should continue to be emptied into the waters of said river, either in Connecticut or at any other point. And further, the defendant denies that considering the present uses of the Connecticut River and of the valley adjacent thereto, either by inhabitants of the Commonwealth of Massachusetts or municipalities therein or by inhabitants of the State of Connecticut, any interference with the flow of the Connecticut River or diminution in the volume of water discharged by it or carried by it, and still less such acts and the execution of such plans as are authorized by the legislation of Massachusetts to provide a domestic supply of water as hereinbefore and hereinafter set forth, will in any way adversely affect the health of the citizens of the State of Connecticut or cause to them any sickness, suffering or discomfort, or in any way cause or make possible disease and epidemics, or that there will be in any way damage caused to the State of Connecticut or to the citizens thereof. The defendant avers that the waters of the Connecticut River at the point where the river crosses the boundary between the State of Connecticut and the Commonwealth of Massachusetts could successfully dilute and carry away several times the volume of sewage now contained in the said waters at that point without in any degree or manner causing sickness,

suffering, epidemic, or even discomfort to the State of Connecticut or to the people thereof, and further, the defendant avers that the diversions of some of the waters of the Swift River and of the flood waters of the Ware River planned and contemplated by the defendant and described in its said legislation will in nowise cause an appreciable diminution in the flow of the Connecticut River at the state boundary, or indeed a diminution which it would be possible to determine by usual methods of stream flow measurement at that point. And further, the defendant affirms that there is an adequate remedy at law for acts or injuries, if any such there may be, incidentally caused to the State of Connecticut or to the citizens thereof; but the defendant denies that there will be any wrongful acts or injuries to the State of Connecticut or to citizens thereof done or caused to be done by the Commonwealth of Massachusetts or by its inhabitants, as in the bill of complaint alleged and set forth. And further answering, the defendant says that all acts referred to in the bill of complaint done or contemplated to be done by the Commonwealth of Massachusetts will, as herein set forth both above and hereafter, benefit the State of Connecticut and the citizens thereof, and that said acts and things done or contemplated to be done are in law and in fact in all respects a reasonable and proper use by the Commonwealth of Massachusetts of the waters of the Swift and Ware rivers in no way inconsistent with any rights, interests, privileges, or immunities of the State of Connecticut or of the citizens thereof.

17. Answering the seventeenth paragraph, set forth on pages nine and ten, of the printed bill of complaint, the defendant admits that it, the Commonwealth of Massachusetts, has already expended certain sums of money in making plans, preparing specifications, advertising for bids from contractors, and doing certain further

acts and things incident to carrying out certain plans to store and to divert, for a domestic water supply for the inhabitants of Boston and its environs, certain waters of the Swift River and of the Ware River, in accordance with the provisions of Massachusetts Acts of 1926, chapter 375, and Acts of 1927, chapter 321, which are annexed to this answer, marked "Appendix A", and made a part hereof, and further answering the defendant avers that said rivers are wholly within the territorial limits of the Commonwealth of Massachusetts. Each and every other material allegation of fact contained in said seventeenth paragraph of the bill of complaint the defendant denies.

And further answering, the defendant says that within the city of Boston in said Commonwealth and within the area immediately about said city there is a rapidly growing population, now containing approximately 1,900,000 persons; that for a long period of time it has been apparent that the present supply of water for drinking and domestic purposes is inadequate and if not supplemented by further supplies of pure water for drinking and domestic purposes the persons residing in the Metropolitan district about the city of Boston and within said city will be unable to continue a normal growth in that region and will be subjected to discomfort, inconvenience, and grave risk and danger from sickness and epidemic; that the taking of certain of the waters of the Ware River and of the Swift River has for more than thirty years been definitely contemplated by the Commonwealth of Massachusetts for the purpose of supplying the Metropolitan area about Boston with water for drinking and other domestic uses; that a study of the water requirements of the city of Boston has gone on for over a century, and that experts in water and sanitary engineering have made frequent and well-considered reports of the situation and problem in this respect; that the overwhelming majority opinion of qualified persons

who have studied the situation has determined that no other satisfactory and adequate source of a supply of water exists for said city of Boston and the Metropolitan area about said city unless it includes the waters of the Ware and the Swift rivers, and that no other supply can possibly meet the reasonable demands and needs of the said area and of its rapidly increasing population; that the population whose needs require the proposed diversions from the Ware and Swift rivers is not only that of the metropolitan area within ten miles of the State House, but also that of several other centers whose future requirements must be met directly from metropolitan sources or from sources close to the metropolitan area which would otherwise be available to the metropolitan district itself, that the total population supplied by the district or whose water supply needs are thus intimately connected with those of the district, is over two and one-half million and rapidly growing, comprising nearly 1,900,000 in the metropolitan area itself, 300,000 in the Merrimac Valley group which have long been demanding water from the Wachusett Reservoir, 275,000 in metropolitan Worcester whose needs are met by areas allotted from the Wachusett drainage area, and 100,000 in Essex County, whose need of the Ipswich River prevents its use by the metropolitan district; that in accordance with the reports of competent authorities the Great and General Court of Massachusetts, by its enactment of Acts of 1926, chapter 375, and Acts of 1927, chapter 321, above referred to and annexed to this answer, has provided for taking the flood waters of the Ware River, as described in said acts, and certain of the waters of the Swift River, as a source of supply of water for domestic purposes for the city of Boston and other communities in and adjoining the Metropolitan area. The defendant avers that the Commonwealth of Massachusetts, in accordance with the provisions of the said acts of the Great and General Court of the Common-

wealth, proposes to divert the flood waters of the Ware River, as defined in said acts, and to store them either in the Wachusett reservoir near the city of Worcester in said Commonwealth or in the reservoir to be constructed in the Swift River Valley in accordance with the provisions of said acts, by the Commonwealth of Massachusetts; that the Ware River will be connected with both the Swift River Reservoir and the Wachusett Reservoir by a system of tunnels, conduits, and aqueducts so that water may be transferred into one reservoir or another as need may require; that the Wachusett Reservoir now directly supplies the city of Boston and the Metropolitan area about said city; that the said Commonwealth proposes to construct, by building certain dams in the valley of the Swift River, a reservoir, which will cover with water a large area in the valley of the Swift River; that in this reservoir it is proposed to store not only large quantities of water of the Swift River in excess of a certain minimum flow, as described in the legislation above referred to, but also certain flood waters of the Ware River, which will be transferred to the said Swift River Reservoir by the said system of tunnels and aqueducts above referred to; that the scope and nature of the works authorized by the said legislation is shown upon a blueprint map of the so-called New England states attached hereunto, to which reference is made hereby, upon which map is shown the small area drained by the Ware River and the Swift River above the points at which the flood waters of the Ware River and certain waters of the Swift River are respectively diverted, and also the large area comprised in the whole watershed of the Connecticut River and the defendant avers that it is clearly and graphically shown by the said map how small, minute, and reasonable with respect to the whole waterflow of the Connecticut River watershed are the watersheds from which a partial diversion is authorized; that in the judgment of the Great and

General Court of said Commonwealth the emergency is so great and the prospect of a failure of a domestic water supply for the Metropolitan district is so imminent as to lead it to provide in said legislation, in order to make possible the location and construction of said reservoir, for the elimination and termination of three historic towns of said Commonwealth, to wit, Enfield, Greenwich, and Prescott; that the Commonwealth has no plan or intention of diverting from the Connecticut River watershed the waters of any other river than the Swift River and the Ware River, and that the acts of the Great and General Court of Massachusetts, set forth in Appendix A hereof, specifically prohibit the diversion or use of any of the waters of the Miller's River; that the proposed diversion of certain of the waters of the Swift River and of the flood waters of the Ware River will in nowise materially affect the flow of the Connecticut River, and that it will be impossible to determine by any practicable measurements at the point where the Connecticut River passes the boundary between the State of Connecticut and the Commonwealth of Massachusetts any diminution in the flow of said river caused by the proposed diversion and storage of the waters of the Ware River and of the Swift River; that in nowise will the State of Connecticut or the inhabitants thereof be injured or damaged, or will their health or safety be imperilled, or will any discomfort be caused to the inhabitants of the State of Connecticut by reason of the said diversion. And the defendant further avers that by the storage of water contemplated the Commonwealth of Massachusetts will reduce somewhat the intensity and severity of certain seasonal floods which take place in the Connecticut Valley and watershed to the great damage of the inhabitants thereof, both within the State of Connecticut and within the Commonwealth of Massachusetts; that all the waters so taken or planned to be taken in order to supply the inhabitants of the city

of Boston and of the Metropolitan area about said city with a necessary, adequate, and satisfactory supply of water for drinking and domestic purposes fall within the territorial limits of the Commonwealth of Massachusetts and are subject to be taken by the said Commonwealth and by the laws thereof and according to the laws in force throughout the United States of America, subject only to the right of the Federal Government to control and regulate navigable waters; that the said taking of waters will in nowise contravene any Federal law or right, nor, if it be here material, which the defendant denies, will said taking in any way impair or impede the navigability of any portion of the Connecticut River; that such uses for drinking and domestic purposes of the waters so to be stored and diverted both in law and in fact constitute a reasonable and proper user of the waters of the Swift and of the Ware rivers, and they are in nowise inconsistent with any rights, interests, privileges, or immunities of the State of Connecticut or of the inhabitants thereof. And further answering the defendant says that by the laws of the State of Connecticut the diversion of water from the watershed of the Connecticut and other rivers is permitted and authorized for the purpose of providing municipal supplies of water for domestic use; and the defendant avers that the law both of the Commonwealth of Massachusetts and of the State of Connecticut permits the reasonable use of water by riparian owners if such use does not unreasonably injure lower riparian owners; that the laws of both said State and Commonwealth permit the diversion of waters, even of interstate streams, for the purpose of providing a water supply for the domestic use of the inhabitants of the community, and permit the diversion of said waters to a watershed beyond the watershed of said stream.

18. Answering the eighteenth paragraph, set forth on page 10, of the printed bill of complaint, the defendant

denies that it, the Commonwealth of Massachusetts, has made extensive surveys, perfected elaborate plans, and proceeded to carry such plans into execution without notice to the State of Connecticut or without any attempt to ascertain whether damage would result, from such diversion of water as is contemplated, to the State of Connecticut or to property owned by the State of Connecticut, or to citizens of the State of Connecticut, or to the interest and welfare of the State of Connecticut; but on the contrary the defendant avers and alleges that the State of Connecticut was fully and completely aware of the plans of the Commonwealth of Massachusetts; that the State of Connecticut was officially represented at hearings before legislative committees of the Great and General Court of the Commonwealth of Massachusetts when the acts authorizing the carrying out of the plans complained of were being considered; that the plans now adopted by the Commonwealth of Massachusetts are the result of a comprehensive study of the water supply problem of the metropolitan district of Boston and that the said study of the problem has been going on for more than a century without in any manner being kept secret; that the recommendations and reports of engineers, water and health experts and other technical students of the situation have been printed and circulated as public documents and have with practical unanimity favored the use of the waters of the Swift River and the Ware River for the purpose of said water supply, and that such waters constitute the only suitable and adequate supply available for the reasonable needs of the metropolitan district of Boston for water for domestic purposes, and that said reports of experts studying the problem have been made public and have been available to officials of the State of Connecticut.

And further answering, the defendant denies that the

taking of certain waters from the Swift River and the flood waters of the Ware River, contemplated by the Commonwealth of Massachusetts, is part of such a general plan as is set forth in the eighteenth paragraph of said bill of complaint or of any plan other than that specifically set out in said legislation a copy of which is hereunto annexed as Appendix A. Each and every other material allegation of fact, if any such there be, contained in said eighteenth paragraph of the bill of complaint is denied by the defendant.

And further answering, the defendant says that any user of said waters done or contemplated to be done constitutes a reasonable user of said waters by the Commonwealth of Massachusetts in no way inconsistent with any right or interest of the State of Connecticut or of the inhabitants thereof.

19. Answering the nineteenth paragraph, set forth on pages 10 and 11, of the printed bill of complaint, the defendant denies that it, the Commonwealth of Massachusetts, has various other plans in addition to the diversion of any waters now contemplated to be taken as authorized by the said legislation or has under construction conduits, reservoirs, and tunnels for the diversion and storage of waters from tributaries of the Connecticut river other than its plans for diversion of certain waters of the Swift River and some of the waters of the Ware River, or that any diversion of waters of rivers other than the Swift and the Ware rivers has been authorized by the Commonwealth of Massachusetts. Each and every other material allegation of fact, if any such there be, contained in the said nineteenth paragraph, is hereby denied, but the defendant avers that said Connecticut River could successfully dilute and carry away several times the volume of sewage contained in said river at the point where it crosses the boundary between the State of Connecticut and the Common-

wealth of Massachusetts without in any degree causing a menace or danger to the health of the inhabitants of the State of Connecticut or causing to said inhabitants any discomfort.

20. Answering the twentieth paragraph, set forth on page 11, of the printed bill of complaint, the defendant, the Commonwealth of Massachusetts, admits that it has already let certain contracts and done certain preliminary work on the construction necessary for the diversion of the flood waters of the Ware River and of such waters of the Swift River as the said Commonwealth proposes to store and divert. The defendant further admits that unless enjoined from so doing it intends to proceed with the work authorized by the Great and General Court of Massachusetts in Acts of 1926, chapter 375, and Acts of 1927, chapter 321; that it is proposing to proceed with such work because of the pressing emergency confronting the Commonwealth with respect to providing a suitable, necessary, and adequate supply of water for drinking and domestic purposes for the city of Boston and for the metropolitan district about said city; that unless a supply is furnished within a very short period the inhabitants of the said area in and about the city of Boston will be subjected to grave and serious dangers of epidemic and disease, and that the inhabitants of the said area will have insufficient water to meet their necessary and reasonable requirements for drinking purposes; that the construction of the work proposed for the diversion described herein and authorized by the said acts will take a considerable number of years, and that the first works for the diversion of the flood waters of the Ware River cannot, according to the best information at the disposal of the defendant, in any event be completed before 1931, and that until that time no diversion of water from the Connecticut River watershed will be effected by the said

works; that by the said diversion, as has been alleged and averred above, only the flood waters of the Ware River, as described in said act, and certain of the waters of the Swift River will be diverted, in no way causing any appreciable diminution in the flow of the Connecticut River at the point where the said Connecticut River enters the State of Connecticut. Each and every other material allegation of fact, if any such there be, contained in said twentieth paragraph of the bill of complaint is denied by the defendant.

21. Answering the twenty-first paragraph, set forth on page 11 of the printed bill of complaint, the defendant, the Commonwealth of Massachusetts, denies each and every material allegation of fact contained in said paragraph. And further answering, the defendant says that any diversion of the flood waters of the Ware River and of such waters of the Swift River as the said Commonwealth plans to divert is within the sovereign and riparian rights of said Commonwealth and authorized by the laws of said Commonwealth and by the laws of the United States of America, and that in nowise is the State of Connecticut, as *parens patriae* or in its own right, or are the citizens of the State of Connecticut, deprived of any of their rights or property, either contrary to law or without due process of law. And the defendant further alleges that by virtue of the provisions of the acts of the Great and General Court of the Commonwealth of Massachusetts, hereinbefore referred to, authorizing the said diversions, due and adequate provision is made for the payment of compensation, not only to citizens of the Commonwealth of Massachusetts but also to citizens of the State of Connecticut, who may suffer any damage by reason of the said diversion, whether such damage be suffered within the Commonwealth of Massachusetts or within the State of Connecticut; and the defendant further alleges

that by the common law of the Commonwealth of Massachusetts, as set forth in the leading case of *Mannville Co.* v. *City of Worcester*, reported in the 138th Massachusetts Reports, at page 89, a remedy is given not only to citizens of the Commonwealth of Massachusetts but to citizens of the State of Connecticut for damages suffered within their borders by virtue of any diversion authorized by the said Commonwealth. And the defendant says that the said remedies in the courts of the Commonwealth of Massachusetts at common law and by virtue of the acts of the Great and General Court, above referred to, constitute a full, sufficient, and adequate remedy at law which may be prosecuted by the State of Connecticut or any inhabitants thereof.

22. Answering the twenty-second paragraph, set forth on page 12 of the printed bill of complaint, the defendant admits that heretofore within the territorial limits of said Commonwealth of Massachusetts certain cities and towns, acting with the consent of said Commonwealth, have constructed certain sewerage systems which in part empty and discharge into the Connecticut River, or tributaries thereof, and further, the defendant admits that certain waste material is discharged by a number of mills and industrial plants within the Commonwealth of Massachusetts into the Connecticut River or into tributaries thereof; but the defendant denies that any such permitted discharge of sewage or other matters by any agency, corporation, or person within the Commonwealth of Massachusetts cannot be carried away and removed unless the present normal flow of the river is maintained, or that the periodic discharge of flood waters is necessary to carry away such sewage and other substance or to cleanse and purify the Connecticut River and the banks and property adjacent thereto. And further answering, the defendant avers that the waters of the Connecticut River at the point where said river passes the boundary

between the State of Connecticut and the Commonwealth of Massachusetts could successfully dilute and carry away several times the volume of sewage and other substances now contained in the said waters without in any way causing damage, injury, or discomfort to the inhabitants of the State of Connecticut. Each and every other material allegation of fact, if any such there be, contained in said twenty-second paragraph of the bill of complaint is hereby denied by the defendant. And further answering, the defendant says that no diversion of water of any tributary of the Connecticut River authorized by said legislation of the Commonwealth of Massachusetts will in any way prevent the proper removal of sewage drained in said river or the purification of said river by the natural processes of the flow of said river.

23. Answering the twenty-third paragraph, set forth on page 12 of the printed bill of complaint, the defendant says that it is ignorant as to what interests the complainant represents and leaves the complainant to prove the same in so far as it is material. Each and every other material allegation of fact, if any such there be, contained in said twenty-third paragraph of the bill of complaint is denied by the defendant.

24. Answering the twenty-fourth paragraph, set out on page 13 of the printed bill of complaint, the defendant denies each and every material allegation of fact contained in said paragraph, particularly denying that the State of Connecticut has either by the law of the State of Connecticut or under the laws of the Commonwealth of Massachusetts, either as a sovereign, as *parens patriae*, or as a riparian owner, any vested right to the waters of the Connecticut River or to any portion thereof above and beyond a reasonable flow within said river. And the defendant further avers that the Commonwealth of Massachusetts by its law and consistently with the laws of the State of Connecticut is entitled as a sovereign

and as *parens patriae* to make reasonable use of the waters of tributaries of the Connecticut River or of the Connecticut River itself within the borders of said Commonwealth, so long as it does not in any material and extraordinary way interfere with a reasonable flow within said river. And the defendant says that it in no way interferes with the flow of said river or of its tributaries or contemplates any such interference or diversion of waters of the Connecticut River or of its tributaries as will in any way injure the State of Connecticut or its inhabitants or will in any way interfere with any rights which the State of Connecticut has under the Constitution of the United States or by virtue of its sovereign rights or by virtue of the laws of nations or of the laws of the State of Connecticut or of the Commonwealth of Massachusetts.

25. Answering the twenty-fifth paragraph, set forth on page 13 of the printed bill of complaint, the defendant denies that the complainant, the State of Connecticut, or its citizens and residents are in any way damaged by any acts done, alleged to be done, or contemplated to be done by the Commonwealth of Massachusetts or by its citizens and residents. And the defendant further denies that the State of Connecticut in any capacity is entitled to any relief in this Honorable Court or that it has set forth any state of facts entitling it to relief in equity by this Honorable Court. Each and every other material allegation of fact, if any such there be, contained in said twenty-fifth paragraph of the bill of complaint or in the prayers of the complainant for relief, numbered 1 through 5 and appearing on pages 13, 14, and 15 of said bill of complaint, is hereby denied by the defendant.

And further answering, the defendant says

First. That a grave and serious emergency exists, as has been above set forth, within said Commonwealth of Massachusetts in that unless a suitable supply of drinking water and of water for domestic purposes is obtained

by the City of Boston and the metropolitan area about said city, the inhabitants of the said area must of necessity be unable to continue their normal growth and life with reasonable safety and comfort within said area, and will be subjected to great risks and menace from disease and epidemic, because of the lack of a suitable supply of pure and unpolluted drinking water which can be obtained from no source within the Commonwealth except from the watershed of the Connecticut River as has been authorized in said legislation with respect to certain waters of the Swift River and the flood waters of the Ware River. That the said Commonwealth has expended large sums in preparation for diverting and storing certain reasonable amounts of the waters of the said Swift and Ware rivers, which diversion will in no way seriously, appreciably, or unreasonably diminish the normal flow of the said Connecticut River or cause damage to the citizens of Connecticut or to the State of Connecticut; that the State of Connecticut has well known for a long time that such reasonable diversion of the waters of the Swift and of the Ware rivers has been contemplated by the Commonwealth of Massachusetts and has failed to make seasonable representations of any damage to said State or to its inhabitants, permitting the Commonwealth of Massachusetts to proceed with its studies, investigations, and plans and to expend large sums for the furtherance of said plans, relying upon the fact that the State of Connecticut, having due notice of the said plans, made no substantial opposition to the legislation pending before the Great and General Court of the Commonwealth of Massachusetts in the form in which the said legislation was finally enacted.

Second. That both the State of Connecticut and its inhabitants have an adequate remedy at law for any damage caused to it or to them by reason of the pro-

posed diversion of certain of the waters of the Swift River and of the flood waters of the Ware River; that the inhabitants of the State of Connecticut, both by virtue of the common law of the Commonwealth of Massachusetts and by virtue of the acts authorizing the said diversions, may sue in the courts of the said Commonwealth for compensation for any damage which they may suffer within said State of Connecticut, and that the State of Connecticut itself may recover such damages as it may suffer by reason of the said diversion, either to its sovereign right or to any riparian rights which it may possess, by an action of law before this Honorable Court.

Third. That by reason of the great emergency existing in the Commonwealth of Massachusetts as above set forth, because of the great and immeasurable suffering which would be caused to the citizens of the Commonwealth of Massachusetts if the said diversion be not permitted, and in consideration of the fact that the State of Connecticut and the inhabitants thereof will suffer no material damage by reason of the said diversion, if indeed they suffer any damage, a court of equity should not grant to the complainant in the premises any specific or injunctive relief, since the complainant in its proprietary capacity as a riparian owner has an adequate remedy at law and in its capacity of *parens patriae* needs no such relief on behalf of or because of the situation of all or any of its inhabitants, all of whom are given by the legislation of the Commonwealth of Massachusetts and by the common law prevailing therein a full, adequate, and complete remedy at law for any damage or injury suffered by them.

Fourth. That under the well established law laid down by this Honorable Court in accordance with the provisions of the Constitution of the United States, the State of Connecticut may not in this court recover any damages in behalf of its individual citizens against the Common-

wealth of Massachusetts, nor may it receive any equitable or specific relief other than that to which it is entitled by virtue of its duties as *parens patriae*.

Fifth. That the allegations contained in the bill of complaint in many and divers places, with respect to any interference which may be caused by the said diversion with the navigability of the Connecticut River are in nowise material, relevant, and pertinent to this bill, inasmuch as exclusive control of navigable waters and regulation of obstructions and diminutions of navigable streams has been committed by the Constitution of the United States to the Congress of the United States, which, in turn, has delegated under general rules administrative power over the said waters to the Secretary of War and the Department of War.

Wherefore, the defendant prays by way of answer in the nature of a motion to strike out, that all such allegations with respect to damage due to interference with the navigability of the Connecticut River be ordered stricken from the bill of complaint as relating to a matter over which this Honorable Court has no jurisdiction.

Sixth. That the complainant has not set forth facts in the bill of complaint sufficient to show any material injury either to the State of Connecticut or to interests of the inhabitants of the State of Connecticut which the complainant is bound to protect as *parens patriae*, and that therefore, by virtue of the long established rule of this Honorable Court that it will not grant specific, equitable, or injunctive relief against a sovereign state of the United States of America, except for grave cause shown and because of serious encroachments upon the sovereign rights of a sister state or upon rights which said sister state is bound to protect as *parens patriae*, exhibited and proved by credible proof supporting specific allegations, the said State of Connecticut is in this case entitled to no specific, equitable, or injunctive relief.

Seventh. That the State of Connecticut has well known for a long time of the plans of the Commonwealth of Massachusetts with respect to the said diversions hereinbefore described, and, after the said plans had progressed materially, brought this bill in equity to enjoin the action of the said Commonwealth, causing great expense and delay to the said Commonwealth.

Wherefore, the defendant prays that it may be compensated for the said expense and delay caused by the complainant, and that it may be allowed its costs of defending this bill of complaint, thus improvidently and unnecessarily brought by the said State of Connecticut.

Eighth. That by virtue of sovereign rights and by virtue of riparian rights according to the laws both of the State of Connecticut and of the Commonwealth of Massachusetts, the Commonwealth of Massachusetts and individual citizens thereof and persons owning land therein are entitled to make reasonable use of the waters of the Connecticut River and of tributaries thereof, not only for purposes of providing adequate supplies of water for drinking and household purposes, but also to make reasonable use of the said waters for drainage and sewage purposes, and the defendant says that it, the said Commonwealth of Massachusetts and the individual citizens thereof now make and will make after the plans now in contemplation by the said Commonwealth are carried into effect, only a reasonable and proper use of the waters of the Connecticut River and its tributaries for any and all the purposes to which the said waters are now put or are planned to be put by the said Commonwealth and its inhabitants, in nowise interfering with any vested or riparian rights of the State of Connecticut or of any inhabitants thereof.

Wherefore, the defendant prays that the bill of complaint exhibited against it, the said Commonwealth of Massachusetts, by the State of Connecticut may be dis-

missed, and that said defendant may be allowed its costs and may be compensated in damages for the delay and expense caused to it by the State of Connecticut and its officers and agents.

COMMONWEALTH OF MASSACHUSETTS,

By

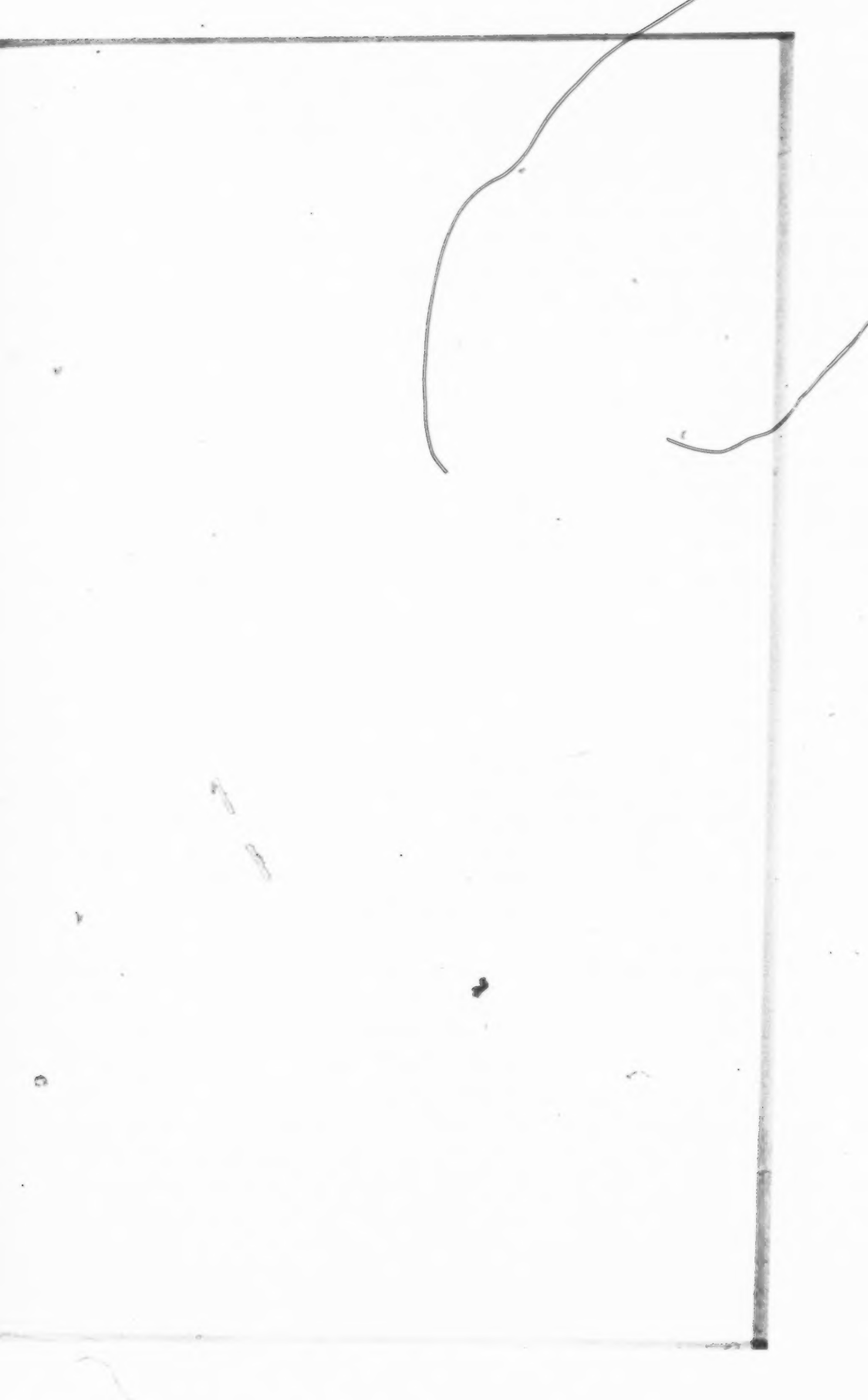
ARTHUR K. READING,
Attorney General
Of the Commonwealth of Massachusetts.

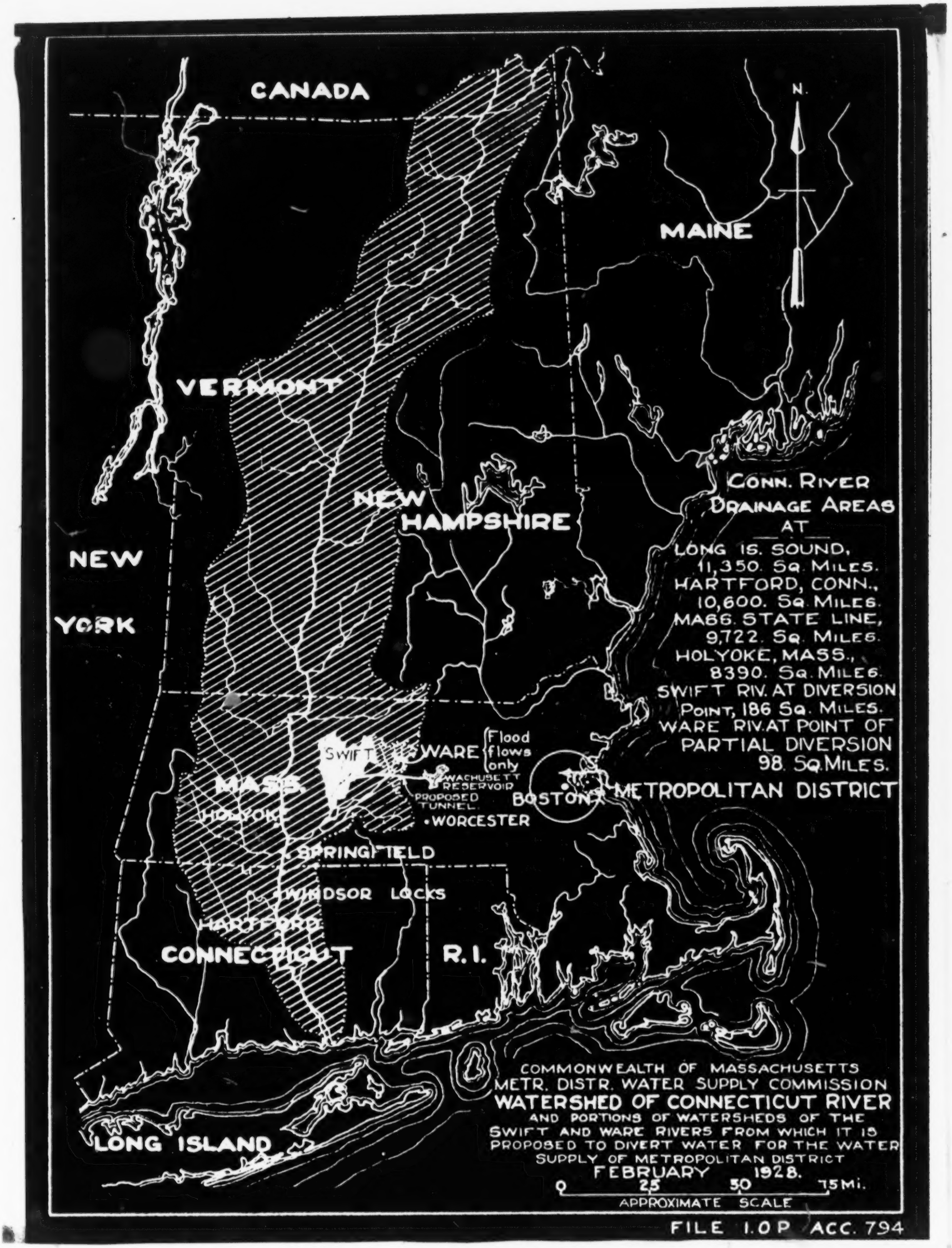
By

BENTLEY W. WARREN,
Special Assistant Attorney General.

Of Counsel:

GERALD J. CALLAHAN,
R. AMMI CUTTER,
Assistant Attorneys General.





FILE 1.0 P ACC. 794

APPENDIX A.

Acts of 1926, Chapter 375.

An Act making Additional Provision for the Water Supply Needs of the Metropolitan Water District and Other Communities which Now or Hereafter may require Water therefrom, and of the City of Worcester.

Whereas, The deferred operation of this act would, in part, defeat its purpose, therefore it is hereby declared to be an emergency law necessary for the immediate preservation of the public convenience.

Be it enacted, etc., as follows:

Section 1. A special metropolitan district water supply commission is hereby established, consisting of the commissioner of the metropolitan district commission as chairman and of two associate commissioners to be appointed by the governor with the advice and consent of the council, said commission to be hereinafter referred to as the commission. The associate commissioners shall serve for terms of five years, or until their successors are appointed and qualified. The governor may with like advice and consent remove any associate commissioner and fill for any unexpired term vacancies which may occur in the associate commissionerships. The chairman shall receive in addition to his salary as commissioner of the metropolitan district commission the sum of twenty-five hundred dollars a year, and the associate commissioners shall each receive a salary of four thousand dollars a year. The commission may hire such offices and other quarters as may be needed for the conduct of its work. The commission may appoint a chief engineer, and with the advice

and consent of the governor and council may fix his salary.

The commission, on behalf of the commonwealth, shall forthwith for the purpose of extending and increasing the water supply of the metropolitan water system, and of such cities and towns not members of the metropolitan water district as may hereafter require water from said system, divert into the Wachusett reservoir of said district the flood waters, as defined in section four, of the Ware river at a point in the town of Oakham or the town of Barre not more than one mile from the bridge of the Boston and Albany railroad crossing said river in the village of Coldbrook, and construct as a part of the metropolitan water system, such works as may be necessary for such extension and increase, and all structures and appurtenances incidental or complementary thereto; provided, that said flood waters shall not be so diverted between May thirty-first and December first in any year unless such diversion be first approved by the state department of public health. Said works, and particularly the aqueduct or tunnel required for said diversion, shall be constructed at such grade and of such capacity and otherwise so that they can be used as a part of works that shall later be constructed for diverting into the Wachusett reservoir the waters of the Swift river, in substantial accordance with the plans and recommendations of the joint board on water supply needs and resources of the commonwealth as contained in its report to the general court in the year nineteen hundred and twenty-two, printed as house document number fifteen hundred and fifty of said year. All plans, maps and records of said joint board relating to the proposed extension to the Ware, Swift and Millers rivers shall be made available to the commission, and the department of public health shall, at the expense of the commission, furnish it, on request, with any information relative to said projects that said department may have in its

possession. In constructing the works herein authorized, the commission may adopt such emergency methods as in its opinion may be necessary or desirable to secure their completion as soon as the public necessity may require.

Said aqueduct or tunnel upon completion to said point of diversion and the diverting dam and other works and property incidental thereto, when completed shall be turned over to the metropolitan district commission, and shall be thereafter maintained by said commission as a part of the metropolitan water system under chapter ninety-two of the General Laws with all the powers and duties conferred by said chapter.

The commission established hereby shall annually, on or before January fifteenth, make a report, in conformity with the provisions of section thirty-two of chapter thirty of the General Laws, for the fiscal year ending on the thirtieth of November preceding, and said report shall be printed as a public document under section six of chapter five of the General Laws.

SECTION 2. In contracts entered into by the commission for the construction of the works herein authorized, there may be inserted a provision that the commission or any contractor or sub-contractor for the commission may employ laborers, workmen and mechanics for more than eight hours in any one day and for more than forty-eight hours in any one week in such construction, when, in the opinion of the commissioner of labor and industries, public necessity so requires. The commission may appoint and in its discretion remove such engineering, legal, clerical and other assistants as it may deem necessry to carry on the work herein authorized, and may fix their compensation in accordance with such rules and regulations as the commission may establish and as shall be approved by the governor and council. Such appointments shall not be subject to classification under sections forty-five to fifty, inclusive, of chapter thirty of the

General Laws, and chapter thirty-one of the General Laws shall not apply to removals, and, in accordance with such regulations as the commission may establish and as shall be approved by the governor and council, any appointment, including that of the chief engineer, may be wholly exempt from said chapter thirty-one. Upon request of the commission, the division of civil service shall hold special examinations.

SECTION 3. For the purpose of providing for the future extension of the metropolitan water system, the commission, on behalf of the commonwealth, may take by purchase or otherwise such lands, water rights, easements and other property in the watershed of the Swift river as it may deem necessary or desirable in preparation for the development of this river as a potential water supply for future use. The commission shall submit to the general court not later than the first Wednesday of January, nineteen hundred and twenty-seven, a draft of such legislation as it may deem necessary or advisable for the development of an adequate future water supply from the Swift river.

The commission shall also consider the recommendations of the metropolitan district commission relative to making available by filtration or chlorination, or both, the waters of the Sudbury and Cochituate watersheds as contained in house document number eleven hundred and ten of nineteen hundred and twenty-six and as referred to in the report of the metropolitan water supply investigating commission in house document number nine hundred of nineteen hundred and twenty-six; shall consider the effect on the present water supply of the metropolitan district of the addition thereto of water purified by filtration or other means and the effect of such water upon the present aqueducts, reservoirs and other facilities of the metropolitan water district; and shall report in detail plans and specifica-

tions for such land takings and for the construction of such additional works in the town of Framingham, and of such covered reservoirs as it may recommend, and the estimated expense thereof. The commission shall also consider and report on the amount of water which should be required for reasons of health and sanitation to flow below dam number one on the Sudbury river notwithstanding any provision of chapter one hundred and seventy-seven of the acts of eighteen hundred and seventy-two, and on all matters set forth in house document number ten hundred and forty-eight of nineteen hundred and twenty-six and the petition accompanying the same, especially the present and future water supply needs and resources of the town of Framingham, and the terms and conditions upon which said town should be entitled to receive water from the water supply now owned by the metropolitan district. The commission shall also consider and report upon the effect of the diversion for water supply purposes of the waters of the South Sudbury river upon public health in the town of Ashland, and whether or not a system of sewage disposal should be provided in said town in the event of such diversion. The commission shall report to the general court its findings and recommendations relative to the questions outlined in this paragraph, together with drafts of such legislation as may be necessary to effect its recommendations, by filing the same with the clerk of the house of representatives not later than December first of the current year, and it shall at the same time file a copy thereof with the budget commissioner.

SECTION 4. For the purposes of this act, the flood waters of the said Ware river which the commission is authorized to divert as provided in section one are hereby defined to be the waters thereof at and above the point of diversion established under section one in

excess of a flow of eighty-five million gallons a day, meaning thereby that on any day when the natural flow of said river is less than eighty-five million gallons no water shall be diverted.

The commission shall establish and maintain proper gauging stations or such suitable regulating devices as may be convenient and practical to establish the aforesaid limit of diversion with reasonable accuracy. Copies of all records obtained at such stations or by such devices shall be open to inspection during reasonable office hours and information shall be furnished, from time to time whenever reasonably requested, to any person owning or operating any mill or manufacturing establishment below the point of diversion or taking, or to the mayor of any city or the chairman of the board of selectmen of any town bordering on said river.

The waters of said Ware river and its tributaries at or above the point of diversion established as aforesaid, other than those authorized to be taken by the provisions of this act, and other than those waters not so taken which are needed for the processes of industry or for reasons of public health, are within its contemplation to be, when and as hereafter authorized by the general court, available for the domestic and public water supply of the city of Worcester and of the towns within the watershed of said river and its tributaries.

SECTION 5. For any of the purposes of this act, the commission, on behalf of the commonwealth, may at any time and from time to time take by eminent domain or acquire by purchase or otherwise the flood waters, as hereinbefore defined, of the Ware river and its tributaries, or any of said flood waters, at or above the point of diversion established under section one, and all water rights, water sources, lands, rights of way, easements and other interests in land, including any cemetery, that may be deemed by the commission to

be necessary or desirable for any of said purposes, or for the further protection of the purity of the waters to be diverted under this act.

Any taking under this act may be in fee or otherwise, perpetual in duration or for a limited period of time, according as the commission shall determine and set forth in the order of taking.

All takings under this act and all proceedings in relation to or growing out of the same shall conform to the provisions of chapter seventy-nine of the General Laws, except in the following particulars:

(*a*) The commission need make no award of damages sustained by persons or corporations in their property by any such taking.

(*b*) The notice required by section eight of said chapter may be given at any time within one year after the recording of the order of taking as provided in section three of said chapter.

(*c*) Petitions for the assessment of damages under section fourteen of said chapter may be filed within two years after the recording of the order of taking provided for in said section three, but petitions for the assessment of damages for the taking of rights of diversion may be filed within two years after, and not before, the actual diversion. The last six lines of section sixteen of said chapter seventy-nine, beginning with the word "but" in line three, shall have no application to takings under this act.

(*d*) For all property taken under this act, except rights of diversion, the right to damages shall vest upon the recording of the taking in the registry of deeds. For taking of rights of diversion the right to damages shall vest upon and not before the actual diversion of water.

The owner of any real estate, whether within or without the commonwealth, which is not taken but is injured by the taking of the waters of Ware river under authority of this act or by the construction of the works incidental

thereto shall be entitled to damages therefor and may recover the same from the commonwealth as in the case of a taking in accordance with the provisions of this act.

SECTION 6. In carrying out the powers and duties conferred upon it by this act, the commission may construct and maintain buildings, machinery, roads, conduits and aqueducts; may lay and maintain pipes, drains and wires; may alter or change the grades or directions of any water course; may carry and conduct any aqueduct, conduit, pipe, drain or wire under or over any water course, or any railroad, street or other way, in such a manner as not unnecessarily to obstruct or impede travel thereon; may dig up any such road, street or way, and lay, maintain and repair aqueducts, conduits, pipes, wires and other works beneath the surface thereof, conforming to any reasonable regulations made by the mayor and aldermen of cities and the selectmen of towns, respectively, wherein such works are performed, and restoring, so far as practicable, any such road, street or way, to as good order and condition as the same was in when such digging was commenced; the commission may enter upon and use the lands of others; may take down dams to such an extent as it may deem necessary for prosecuting its works, and shall rebuild such dams whenever the necessity for keeping them down ceases; shall use such lands and do all work relating to such dams, in a reasonable manner with regard to the interests of the owners thereof, and, so far as practicable, shall heed all reasonable requests made by such owners; and in general may do any other act or thing necessary or proper for carrying out the powers and duties conferred upon it by this act.

The commission may raise or alter or discontinue parts of any railroad or public way, and, in case of a railroad, shall make such raisings or alterations of the railroad or construct upon existing or other locations parts of the railroad to take the place of the parts so discontinued,

as and in such manner as shall be mutually agreed upon by the commission and the board of directors of the railroad company, and, if they cannot agree thereon, then as and in such manner as shall be determined on the application of either party in writing by the department of public utilities, which is hereby authorized and directed to adjudicate finally upon the same; and, if the commission shall be of the opinion that the making of any such change of grade, alteration or construction requires that lands or rights therein be taken therefor, the commission shall, on behalf of the commonwealth, take such lands or rights therein and convey the same to the railroad company, to be thereafter held and used as the board of directors of such company may determine, and the railroad company may, if it desires, locate its lines over any lands or rights therein so conveyed to it, and, when said new lines of railroad are completed, the railroad company may discontinue the operation of the portions of its existing lines for which the new lines are substituted, and may maintain and operate said new lines of railroad; and the commission shall make the raisings or alterations of public ways as aforesaid and build in place of the parts of public ways discontinued as aforesaid such other reasonable and suitable ways, which shall thereafter be highways, as and in such manner as shall be mutually agreed upon by the commission and the county commissioners of the county in which the work is done, or, if they cannot agree thereon, then as and in such manner as shall be determined on the application of the commission in writing by the division of highways of the department of public works, which division is hereby authorized and directed to adjudicate finally upon the same.

The commission, in flooding or otherwise affecting any burial ground, shall conform to any reasonable requirements relating thereto of the board of health of the city or town in which the same is located.

The commission may make such surveys, borings and do such other preliminary work on private lands as the commission may determine to be necessary or desirable, doing as little damage as possible and paying for the same.

SECTION 7. The commission may sell at public or private sale, or exchange or lease any property, real or personal, or any easement or water right, whether taken by eminent domain or otherwise acquired, which in the opinion of the commission is no longer needed for the purposes of this act. Any sums of money so received shall be applied to reduce construction costs or to reduce the bonded indebtedness for the works. The commission may, by lease, license or contract, permit the construction and maintenance on or over any land or waters under its control of towers, poles, wires and other structures for the purpose of transmitting electric power. The commission may construct, maintain and operate such power plants and other structures as may in its opinion be necessary to utilize the fall of water created at any of the dams, channels, tunnels or other structures under its control, for the production of power or electricity; may locate, construct and maintain lines for transmitting the same; and may sell or contract for the sale or use of any power or electricity so created, and any sums of money so received shall be applied to reduce the charges of maintenance of said works.

SECTION 8. For the purpose of carrying out the provisions of this act, the commission may expend such amounts, not exceeding in the aggregate fifteen million dollars, including the sum required to be paid by the city of Worcester under section twelve, as may, from time to time, be approved by the governor and council. To meet such expenditures, the state treasurer shall, from time to time, on the request of the commission and subject to such approval, issue bonds of the commonwealth to an amount not exceeding the sum of

fourteen million dollars, which shall be designated on their face, Metropolitan Additional Water Loan, Act of 1926. Such bonds shall be issued as coupon or registered bonds, for such term of years as may be recommended by the governor, in accordance with section three of Article LXII of the amendments to the constitution, and shall bear interest at such rate as shall be fixed by the state treasurer, with the approval of the governor and council. The amounts necessary to meet interest and serial payment requirements on said bonds and the expenses of maintaining and operating the works to be constructed by the commission under this act, and such other expenses as may be authorized hereunder, shall be added to the annual assessments upon the cities and towns comprising the metropolitan water district and apportioned and collected as provided by section twenty-six of chapter ninety-two of the General Laws.

SECTION 9. The supreme judicial court or any justice thereof and the superior court or any justice thereof, during a sitting of the court or in vacation, on the petition of the commission or of any city, town, corporation or person interested, or of the attorney of any such petitioner, shall have jurisdiction in equity or otherwise to enforce the provisions of this act and of any rule, regulation or order made under the authority of the same and to prevent any violation of said provisions, rules, regulations or orders; provided, however, that no suit in which the right of the commission to make any taking authorized by this act is questioned shall be brought except in the supreme judicial court for the county in which said taking has been made or is to be made, nor unless the said suit is brought within six months after the passage of this act.

SECTION 10. No person shall after the effective date of this act erect a dam for mill purposes across the

Ware river or any of its tributaries above the point of diversion authorized by this act without the consent in writing of the commission, or, after said works have been turned over to the metropolitan district commission, of said metropolitan district commission. In granting its consent, either commission may impose such conditions as it may deem to be for the public interest. Any person owning a practicable mill site on said river or any of its tributaries who applies for such consent and is refused, or is granted consent subject to conditions, and who is damaged in his property by such refusal or by the imposition of such conditions, may recover from the commonwealth the damage so caused in the manner provided in section five.

SECTION 11. The towns of Hubbardston, Barre, Oakham, Hardwick, New Braintree, Palmer and Ware, or any of them, may take from the Ware river above the point of diversion established under section one so much of the water thereof as they, or any of them, have already been, or may hereafter be, authorized by the legislature to take for supplying their inhabitants with water, and in case any of said towns shall hereafter on its application therefor be authorized to take such water it shall pay to the commonwealth, on behalf of the metropolitan district, a fair proportion of the cost incurred by the commonwealth for the acquisition under the provisions of this act of the waters of said river, or rights therein, and for the construction, maintenance and operation of such works and structures as are by this act provided for, including a fair proportion of the cost of maintaining the purity of said water, the said proportion to be determined by an engineer designated by the metropolitan district commission and by an engineer appointed by such applicant town, and, if they cannot agree, such proportion shall be determined by a master to be appointed by the supreme judicial

court on the petition of the commonwealth or said applicant town, and the report of the master when affirmed by said court shall be final and conclusive on all parties.

SECTION 12. The city of Worcester is hereby authorized, for the purpose of meeting the requirements of said city for increasing its water supply and such requirements of adjacent and nearby towns now supplied or hereafter required to be supplied by said city, from time to time, to acquire by purchase or otherwise, or take by eminent domain in accordance with the procedure set forth in section five, and subject to the provisions thereof, and to hold and convey, directly or indirectly, into and through said city the waters of South Wachusett brook, so-called, and the waters of Quinapoxet river, so-called, in the town of Holden, at or near an elevation of seven hundred and eight feet above mean sea level at Boston, at or above the outlet of Quinapoxet pond, including the waters in any ponds or reservoirs thereon and the waters flowing directly or indirectly, into and from the same, and all springs and tributaries thereto, and the water rights connected with the aforesaid waters and sources above the places of taking; and the said city may take existing reservoirs and ponds upon said streams and their tributaries above the points at which it is authorized as aforesaid to take the said waters, but the total supply herein authorized to be taken shall not exceed in any calendar year an average quantity of ten million gallons of water per diem, and the balance of the waters remaining, and also from time to time such part of the quantity of water herein authorized to be acquired and diverted as is not, in the opinion of the water commissioner of said city, needed for the supply of the water system of said city, shall be permitted to flow to the Wachusett reservoir of the metropolitan water

system; provided, that if in the opinion of the metropolitan district commission, the needs of the metropolitan water system, pending the completion of the works necessary to divert the flood waters of the Ware river as authorized in section one, require that said amount herein authorized to be taken by the said city be reduced, the metropolitan district commission may, at any time and from time to time, reduce said amount to not less than an average quantity of five million gallons of water per diem. In case of such reduction the commonwealth on behalf of the metropolitan district shall pay the city of Worcester for the amount of water so withheld by such reduction at the rate of forty dollars per million gallons. The said city shall take such measures to protect and preserve the purity of the said waters and shall maintain such sanitary conditions relative thereto and in their respective watersheds as the state department of public health may require. Said city may by aqueduct or pipe line conduct the waters so taken, into the city directly or through any reservoir and any aqueduct or pipe line belonging to said city and now existing. The said city may, for the purposes aforesaid, construct, lay and maintain conduits, pipes, canals, water courses, dams, reservoirs and other works under or over lands, water courses, railroads, railways, public or private ways and along such ways, and may take by purchase or otherwise and hold in fee or otherwise any lands, dams or structures, easements or rights in land that may be deemed necessary for said purposes and for collecting, purifying, storing, discharging, conducting or distributing said waters or preserving the purity thereof. The water taken by said city under this section shall be measured in a manner approved by the metropolitan district commission which shall have at all reasonable times

free access to any apparatus or device used for measuring the same and to the records thereof.

In addition to such payments and damages as said city may be required to make for any purchases or takings hereinbefore authorized, it shall pay into the state treasury on or before the first day of July, nineteen hundred and twenty-seven, the sum of one million dollars, and thereupon the metropolitan district commission, acting for the commonwealth, shall release and convey to said city all right and title to said waters, subject to the provisions of this act. The amount so paid into the state treasury shall be used toward defraying construction costs incurred by the commission under this act.

In consideration of the provisions of this section, it is within the contemplation of this act that no further claim be made by the city of Worcester to any further part of the watershed tributary to the Wachusett reservoir for water supply purposes.

SECTION 13. For the purpose of meeting expenditures required under the preceding section, the city of Worcester may borrow from time to time, within a period of eight years from the effective date of this act, such sums as may be necessary, not exceeding, in the aggregate, two million five hundred thousand dollars, and may issue bonds or notes therefor, which shall bear on their face the words, City of Worcester Water Loan, Act of 1926. Each authorized issue shall constitute a separate loan, and such loans shall be payable in not more than thirty years from their dates. Indebtedness incurred under this act shall be in excess of the statutory limit, but shall, except as herein provided, be subject to chapter forty-four of the General Laws.

SECTION 14. The said city shall, at the time of authorizing said loan or loans, provide for the payment

thereof in accordance with section thirteen; and when a vote to that effect has been passed, a sum which, with the income derived from water rates, will be sufficient to pay the annual expense of operating its water works and the interest as it accrues on the bonds or notes issued as aforesaid by the city and to make such payments on the principal as may be required under the provisions of said section thirteen shall, without further vote, be assessed by the assessors of the city annually thereafter in the same manner as other taxes, until the debt incurred by said loan or loans is extinguished.

Approved May 28, 1926.

Acts of 1927, Chapter 321.

An Act making Additional Provision for the Water Supply Needs of the Metropolitan Water District and for Communities which Now or Hereafter may require Water therefrom, by the Development of an Adequate Future Water Supply from the Swift River.

Whereas, The deferred operation of this act would in part defeat its purpose, therefore it is hereby declared to be an emergency law, necessary for the immediate preservation of the public convenience.

Be it enacted, etc., as follows:

Section 1. The metropolitan district water supply commission, established by chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six, hereinafter referred to as the commission, on behalf of the commonwealth, shall forthwith, for the purpose of adding to, extending and further developing the additional sources of water supply of the metropolitan water system provided for in said chapter three hundred and seventy-five, divert into the Wachusett reservoir of the metro-

politan water system the waters of the Swift river, and of Beaver brook, a tributary of the Ware river, by the construction of an extension, to the Swift river, of the aqueduct or tunnel between the Wachusett reservoir and the Ware river at or near Coldbrook provided for in said chapter three hundred and seventy-five, and by the construction of a temporary diversion dam as may be required at a point on the Swift river below the confluence of the east and middle branches or at a point on the east branch near the village of Greenwich, and ultimately by the construction of a dam across the Swift river at or near the boundary line between the towns of Ware and Enfield, and of a dam across Beaver brook at or near said boundary line, thereby creating a storage reservoir in the Swift river valley. No water shall be diverted or stored in any calendar day when the flow of the Swift river at or just above the village of Bondsville in the towns of Palmer and Belchertown is less than twenty million gallons; and there shall be discharged from any storage created by the commission above said village a sufficient amount of water to maintain, so far as such storage will allow, a flow of said river at said village of not less than twenty million gallons in each calendar day.

The commission may also divert into the aqueduct or tunnel between the Wachusett reservoir and the Ware river, provided for in said chapter three hundred and seventy-five, the waters of the Quinapoxet river at a point in the town of Holden about one mile westerly from the boundary line between the towns of Holden and West Boylston. The flow of the Quinapoxet river at said point of diversion shall not be diminished by said diversion to less than one million gallons in each calendar day.

The commission shall establish and maintain proper gauging stations, or such regulating devices as may be convenient and practical, to limit the diversion of the waters of the Swift and Quinapoxet rivers as aforesaid

and to establish and maintain the aforesaid flow of the Swift river at or just above Bondsville with reasonable accuracy. Copies of all records for the Swift river obtained at such stations or by such devices shall be open to inspection during reasonable office hours, and information shall be furnished from time to time, whenever reasonably requested, to any person owning or operating any mill or manufacturing establishment below the dam across the Swift river authorized by this act, or to the mayor of any city or the chairman of the board of selectmen of any town bordering on the Swift or Chicopee rivers.

All or any part of the flood waters of the Ware river, as defined in section four of chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six, authorized to be diverted at or near Coldbrook by said chapter three hundred and seventy-five, or of the waters of the Quinapoxet river herein authorized to be diverted, may be diverted, at such times as may be necessary or desirable for storage, into the Swift river reservoir pending the ultimate diversion thereof into the Wachusett reservoir.

SECTION 2. The commission may construct as a part of the metropolitan water system such aqueducts, tunnels, dams, reservoirs and other works as in its opinion may be necessary for the additions, extensions and developments authorized by this act and all structures and appurtenances that in the opinion of the commission are desirable as incidental or complementary to such additions, extensions and developments. The commission shall also collect and publish in its reports such information as to the geology of the region in which any of the works which it is authorized to construct may be located as may be of value in connection with the geological history of the state. The works authorized by this act shall be of such dimensions, capacities and

areas as the commission may determine, and may from time to time be enlarged or modified as the commission may determine; and may be so constructed, enlarged or modified as to allow for a future increase in capacity to take care of the diversion of other streams in substantial accordance with the plans and recommendations of the joint board on water supply needs and resources of the commonwealth as contained in its report to the general court in nineteen hundred and twenty-two printed as house document fifteen hundred and fifty of that year; but nothing in this act shall be held to authorize any taking or diversion of any waters of the Millers river water shed or to affirm the intention of taking at any future date any unutilized flood waters of said Millers river.

Except as otherwise in this act provided, all the property acquired and works constructed under this act shall when completed be turned over to the metropolitan district commission, and shall thereafter be maintained and operated by it as a part of the metropolitan water system under chapter ninety-two of the General Laws with all the powers and duties conferred by said chapter.

SECTION 3. In constructing the works authorized by this act the metropolitan district water supply commission shall proceed with the organization and in the manner provided by said chapter three hundred and seventy-five. All of the provisions of section two of said chapter three hundred and seventy-five relative to the employment of laborers, workmen and mechanics and relative to the appointment, removal and fixing of compensation of all employees of the commission, including the appointment and removal of a chief engineer, shall apply in carrying out the provisions of this act. None of the employees of the commission, whether appointed before or after the effective date of this act, shall become members of the state retirement system, but those who are members

thereof at the time of their employment may be continued therein.

SECTION 4. For any of the purposes of this act, or for the further protection of the purity of the waters to be diverted under this act, or for the purpose of providing for a future increase in the capacity of the Swift river reservoir, the commission on behalf of the commonwealth may, at any time and from time to time, take by eminent domain or acquire by purchase or otherwise, such lands, waters, water rights, easements and other property or interests in property, including any cemetery, as it may deem necessary or desirable; provided, however, that the amount of water to be let down into the Swift river as provided in section one of this act shall not be diminished by any taking under this act.

The commission shall take or otherwise acquire in fee all lands which will be submerged by the construction of dams and reservoirs under this act.

For any of the purposes of this act, the commission may take and use the waters of any great pond within the water shed of the Swift river, and thereafter any other public use of such great pond and the waters thereof shall cease.

The commission may also take and use, for the purposes of this act or of said chapter three hundred and seventy-five, any land or rights in land of the commonwealth upon such terms and conditions as may be agreed upon by the commission and the state department or other authority which at the time is vested by the commonwealth with the care and control of such lands or rights, and if the commission and such department or other authority cannot agree upon said terms and conditions, then such terms and conditions shall be fixed by the governor and council.

Any taking under this act, except as hereinbefore in this section provided, may be in fee or otherwise, perpetual in duration or for a limited period of time, ac-

cording as the commission shall determine and set forth in the order of taking.

All takings under this act of property or rights in property and all proceedings in relation to or growing out of such takings shall conform to the provisions of chapter seventy-nine of the General Laws, except in the following particulars:

(*a*) The commission need make no award of damages sustained by persons or corporations in their property by any such taking.

(*b*) The notice required by section eight of said chapter seventy-nine may be given at any time within one year after the recording of the order of taking as provided in section three of said chapter.

(*c*) Petitions for the assessment of damages under section fourteen of said chapter seventy-nine may be filed within two years after the recording of the order of taking provided for in said section three, but petitions for the assessment of damages for the taking of rights of diversion appurtenant to land not taken may be filed within two years after, and not before, the actual diversion. The last six lines of section sixteen of said chapter seventy-nine, beginning with the word "but" in line three, shall have no application to takings under this act.

(*d*) For all property taken under this act except rights of diversion appurtenant to land not taken, the right to damages shall vest upon the recording of the taking in the registry of deeds. For all rights of diversion taken under this act appurtenant to land not taken, the right to damages shall vest upon and not before the actual diversion of water.

At any time after the passage of this act, the commission before or after the actual diversion of water may make such settlements as it may deem for the best interests of the commonwealth with any person or corporation

who may be or has been damaged by any taking of or injury to his water rights under this act and in making any such settlements the commission may, subject to the approval of the governor and council, make a contract, which shall be in a form approved by the attorney general and shall be binding upon the commonwealth and such owner or person and his successors in title, with respect to the amount of the flow down the stream to which such water rights are appurtenant, or to the time and manner of such flow, or may agree to furnish in some other way a substitute for the water rights which have been or may be taken or injured. Such contract, if acknowledged by the owner or commission or any member of it before a justice of the peace or a notary public, may be recorded in the registry of deeds in the county in which the land to which such water rights are appurtenant is situated.

SECTION 5. Any person or corporation owning at the time of the passage of this act any real estate which is not taken or purchased for the reservoir or the protection of the waters thereof under the provisions of this act situated within the territory comprised in the towns of Dana, Enfield, Greenwich and Prescott or within those portions of the towns of Belchertown, Hardwick, Pelham, Petersham, New Salem, Shutesbury and Ware not more than one mile distant from land required to be purchased or taken in fee under the second paragraph of section four of this act which real estate is decreased in value by the carrying out of the provisions of this act, or any person or corporation owning at the time of the passage of this act an established business on land within territory defined in this paragraph, which business is decreased in value, whether by loss of custom or otherwise, by the carrying out of the provisions of this act shall be entitled to recover damages in the manner hereinafter provided in this section. The com-

mission, however, in its discretion, if it finds that any such person or corporation has an established business located near to but outside the areas defined in this paragraph which has been actually decreased in value by the carrying out of the provisions of this act and which person or corporation would have been entitled to damages under this section if located within the areas defined in this paragraph, may make such settlement by agreement with such person or corporation as it may deem just, but only upon the filing of a claim therefor within the time hereinafter provided in this section.

Any resident of the towns of Dana, Enfield, Greenwich, Prescott or New Salem at the date of the passage of this act who had been for the six months next previous thereto regularly employed therein in a manufacturing establishment or in an established business or upon any lands and is not the owner or part owner of any interest in any such business or lands who, by the carrying out of the provisions of this act, is deprived of such employment and obliged to seek other employment or has suffered a diminution in wages shall, if upon reasonable effort he has been unable to secure such employment or to avoid such diminution in wages, be entitled to recover either by agreement with the commission or in the manner hereinafter provided in this section his damages in loss or diminution of wages, not exceeding, however, the amount of wages received by him for the six months previous to such loss of employment. No person shall have any right of recovery for more than one such loss of employment or one such diminution in wages under the provisions of this paragraph and no person shall have the right to recover for both injury to an established business under the provisions of the preceding paragraph and for loss of employment therein.

Any wage earner who at the time of the passage of this act resides in the town of Dana, Enfield, Greenwich, Prescott or New Salem who makes no other claim for damages under this act shall in case he is forced by the carrying out of this act to remove to a locality more than eight miles from land required to be taken in fee under the second paragraph of section four of this act be repaid the actual cost of such removal to an amount not exceeding fifty dollars.

Any person or corporation claiming to be injured as provided in this section, if such person or corporation so elects, may, after November first, nineteen hundred and twenty-eight but not later than six months from the date of the annexation of the towns of Enfield, Greenwich and Prescott, as provided in section thirteen of this act, file with the commission a sworn statement of his claim, setting forth the facts upon which it is based and the amount claimed, and if the commission cannot agree with such claimant upon the amount of such damage, or if the payment agreed to of such claim is not made within six months after such sworn statement is filed, then for determination of his damages, such claimant may within sixty days thereafter file a sworn copy of such statement of claim with the board of referees hereinafter provided. A justice of the supreme judicial court, either in term time or vacation, upon application by the commission or any other party in interest and after publication, or such other notice as the court may order, shall from time to time as the need may exist appoint one or more boards of referees, each consisting of three disinterested persons for the determination of damages, and may after notice and hearing of any parties interested, fill any vacancy on such boards. The compensation of such referees shall be fixed by the supreme judicial court in its order of appointment, and the same, together with such expenses as may necessarily be incurred by the said referees, shall if approved

by the said court be paid by the commission. The board shall determine its procedure including all matters relating to the form and place of application subject to the approval of said court. Upon reference of any claim within the provisions of this section, and after notice to the parties and hearing thereon, the board shall determine the amount of damages suffered and shall certify its findings to the commission; which findings shall be conclusive upon all parties except that any party in interest aggrieved by a ruling of the referees on a question of law may object thereto and the supreme judicial court shall have power to review and modify any finding to the extent that it may be an error in that respect, but not otherwise. If any person or corporation has a claim for damage under this section and also a claim for damages to property or rights in property within the provisions of section four of this act, the referees to whom said first named claim is referred under the provisions of this section shall, upon written application by the claimant, with the assent of the commission, have jurisdiction to determine both said claims.

Any person or corporation presenting a claim under this section for decrease in value of any parcel of land or of a business shall have no further claim under this section for damages to such land or business and all existing claims whether for damages to land, business or employment shall be included in one statement.

No right to recover damages or to receive any payment under this section shall be assignable, but any such right shall survive to the heirs at law of the party entitled.

SECTION 6. Prior to the taking under section four of this act of any land or rights in land within the territory described in the first paragraph of section five of this act which will be required for the reservoir or the protection of the waters thereof, the owner of any such land or rights in land may at any time after November first, nineteen

hundred and twenty-eight, if he so elects, file with the commission a sworn statement of the location, nature and extent of such land or rights together with such further information as the commission may require, the sum he is willing to accept therefor and a request that such land or rights be acquired. If in the opinion of the commission such land or rights are within the said territory and will be required, it shall with all due diligence make a search of the title and if it deems it necessary a survey, and shall furnish said owner with a statement of any defects in the title. As soon thereafter as the owner delivers to the commission a deed and all other instruments necessary to convey to the commonwealth a merchantable title to such land or rights and files a sworn copy of said statement with the board of referees, as provided in section five of this act, he shall have a claim for damages for the value of such land or rights, which value said board shall determine, as provided in said section five, unless a settlement has been previously effected by agreement. The said board shall certify its findings to the commission and the owner, which said findings shall be conclusive upon all parties except as otherwise provided in said section five.

In determining the value of any land acquired under this section within the territory described in the first paragraph of section five of this act, or the damage to any business as provided in the first paragraph of said section five, said board of referees may include in such value of land or damage to business such depreciation of value of land or decrease in value of business, if any, in addition to any damages which would otherwise accrue, as in the opinion of the said board may have been caused between January first, nineteen hundred and twenty-six, and the date of the passage of this act by reason of proposed legislation resulting in this act.

The board of referees may consider as an element of damage, in determining the value of any land used for

farming purposes acquired under this section and owned at the date of the passage of this act by a person whose principal business is farming and who is no longer to continue that occupation in that neighborhood, any difference between the fair value of tools and implements used by him for farming purposes and the value thereof at a forced sale.

SECTION 7. The commission may either before a taking or afterward make such settlements as it may deem for the best interests of the commonwealth with any person or corporation having a valid claim under this act.

SECTION 8. If any public ways are within the area taken in fee by the commission, such portions thereof as the commission shall determine shall, at such time after such taking as the commission shall so notify the public authorities charged with their continuance and maintenance, be discontinued. The commission shall provide, when reasonably practicable, and public necessity or convenience require, other suitable ways in lieu of those discontinued, and may acquire by purchase or otherwise as provided by this act any lands or rights in land needed therefor. The practicability, public necessity and convenience and the location and character of any such new ways shall be determined by agreement between the commission and the county commissioners of the county or counties in which any discontinued way is situated, or, if they are unable to agree, by the department of public works.

The commission shall cause such public ways as it shall establish or alter under the provisions of this section to be constructed and graded so that they shall be reasonably safe and convenient for travel, and shall upon the completion of such ways give written notice to the selectmen of the town in which each such way or portion thereof is located that such way is open for

travel, and thereafter such ways or parts thereof shall be maintained and kept in repair by the towns in which they are located. If however the total highway mileage other than state highways within such portion of any town as is not taken or acquired in fee under the second paragraph of section four of this act shall because of the relocations caused by the carrying out of this act exceed the mileage in such portion of said town at the time of the passage of this act, said commission shall pay to such town any amount which the governor and council shall deem proper for the added burden for the future care and maintenance of such additional highway mileage.

Any public ways or portions thereof within the area taken in fee by the commission shall, until such time as they may be discontinued as provided in this section, continue to be maintained as highways with the same rights and duties of counties, towns and other parties as before such taking, except that such public ways in the towns of Enfield, Greenwich and Prescott shall, after the annexation of said towns, as hereinafter provided, be maintained by the commission to the extent and in the manner provided in section seventeen of this act.

SECTION 9. If any burial ground, cemetery, grave or place of human burial is within the area taken in fee by the commission, or is located so near to the reservoir or other waterway as to be liable to pollute or reduce the quality or value of any such waters as a potable water supply, the commission shall remove the remains found in any such burial places. The commission may agree with the next of kin, or other persons having the right to represent or dispose of such remains, as to the place or places to and in which such remains shall be removed and reinterred, and in such case the commission may pay the reasonable cost of a burial lot and shall pay the expenses reasonably

necessary for such removal, including the removal and resetting of the gravestones, monuments and markers of such graves. In any case where such next of kin or other persons are unknown or unascertainable, or where there is no such agreement, the commission shall furnish a place or places for such reburials, and may establish a general burial ground or grounds therefor, and subject to the provisions of section thirty-five of chapter one hundred fourteen of the General Laws, may acquire by purchase or otherwise as provided by this act any lands needed therefor. Any such general burial ground or grounds shall upon their completion be transferred to such trustees, persons, municipalities or public officers as may be agreed upon by the parties at interest, and in case no such agreement is made, then to the body corporate or to the public officials charged with the care of cemeteries in the town in which such burial ground is located, and any such agreement or transfer shall include the transfer of any trust funds established for the benefit or care of the cemetery or lots therein which contained remains thus removed to such general burial ground and upon any such transfer of a general burial ground, the commission shall pay to the body corporate or public officials to whom such transfer is made such additional sum as the governor and council shall deem to be requisite and reasonable for the care, maintenance and preservation of such burial ground.

Such removal of bodies shall be made without undue delay upon the request of the descendants or relatives of such deceased persons or of such persons as appear to the commission to be entitled to ask for such removal. Before any existing burial ground is submerged, all bodies, tombs and monuments shall be removed. After a suitable burial ground has been provided by the commission no burial shall be made in any burial ground which will be flowed or affected by the carrying out of this act, but the

bodies of any persons which would otherwise be entitled to burial in such burial ground may be buried in such lot in the new burial ground as may be provided by the commission. To whatever cemetery a body may be removed, if the lot from which the body has been taken was under perpetual care, then the additional cost, if any, for perpetual care in the place of removal to an amount not exceeding one hundred dollars shall be provided by the commission for the lot to which removal has been made.

The commission in carrying out the provisions of this section shall conform to any reasonable requirements of the board of health of the town in which any burial ground so flowed or otherwise affected is situated.

SECTION 10. The commission may alter, relocate or discontinue the whole or any parts of any rights of way belonging to any railroad corporation or electric transmission company and in case of such alteration or relocation may construct upon existing or other locations parts of the railroad or transmission line to take the place of the parts so discontinued, or the railroad or transmission line, any part of which is taken, may in whole or in part be discontinued or abandoned as and in such manner as shall be mutually agreed upon by the commission and the board of directors of the railroad corporation or electric transmission company subject to such approval as is required by law of any state or federal authorities, and if the commission and such companies cannot agree thereon, then as and in such manner as shall be determined, on the application in writing of either party, by the department of public utilities, which is hereby authorized and directed to adjudicate finally upon all questions relative thereto, subject to such approval of any federal authorities as is required by law. If the commission shall be of the opinion that any such alteration or construction requires that lands or rights therein be taken therefor, the

commission may take or acquire by purchase or otherwise, as provided by this act, such lands or rights therein and may convey the same to the railroad corporation or electric transmission company to be thereafter held and used as the property of such corporation or company for railroad or transmission line purposes, and such railroad corporation or electric transmission company may file a description of said relocation with the county commissioners and may maintain and operate said relocated lines of railroad or transmission lines with the same powers, rights and duties as in the case of the original lines.

The provisions of section five of this act shall not apply to railroad corporations or to electric transmission companies engaged in supplying electricity in bulk, as such term is defined in section one of chapter one hundred and sixty-four of the General Laws, or to other public utilities directly engaged in interstate commerce.

In any claim by any railroad corporation or electric transmission company for damages arising from the carrying out of this act, the relocation of the railroad or electric transmission line right of way of such corporation or company may be shown in mitigation of damages.

SECTION 11. In carrying out the powers and duties conferred upon it by this act the commission may construct and maintain dams, buildings, machinery, roads, conduits and aqueducts, may lay and maintain pipes, drains and wires, may alter or change the grade or direction of any water course, may carry and conduct any aqueduct, conduit, pipe, drain, or wire under or over any water course or any railroad, street or other way in such a manner as not unnecessarily to obstruct or impede travel thereon, may dig up any such road, street or way and lay, maintain and repair aqueducts, conduits, pipes, wires and other works, beneath the surface thereof, con-

forming to any reasonable regulations made by the mayor and aldermen of cities and the selectmen of towns, respectively, wherein such works are performed and restoring, so far as practicable, any such road, street, or way to as good order and condition as the same was in when such digging was commenced; may make such surveys and borings and do such other preliminary work on private lands as it may determine to be necessary or desirable, doing as little damage as possible and paying for the same; may enter upon and use land owned by others and, so far as practicable, shall heed all reasonable requests made by such owners; and in general may do any other act or thing necessary or proper for carrying out the powers and duties conferred upon it by this act.

The commission shall have exclusive right and control during construction and until turned over to the metropolitan district commission or to others as authorized in this act, of all properties, ponds, water sources, cemetery sites and other works of every description purchased or taken by the commission or constructed by it under this act, and may order any or all persons to keep from entry in or upon the same and shall, through their agents, have full power to carry out these provisions with respect thereto, and the courts having jurisdiction shall have full authority for the enforcement of the provisions of this section.

The commission shall provide, or may agree with the local authorities in any town in which work is done under this act to pay for such additional police protection as is made necessary by the doing of such work.

No town within which are included the areas of Enfield, Greenwich or Prescott taken in fee for reservoir purposes or for reservoir protection shall be required after the completion of the reservoir to bear any costs of or expenses for schools, policing or fire, gypsy moth or other insect pest protection within said reservoir areas described in this paragraph.

SECTION 12. Any town, other than Enfield, Greenwich or Prescott, from which any property which it holds in its private or proprietary capacity is taken under this act or which is otherwise consitutionally entitled to compensation for damage suffered under this act, may recover such damage from the commonwealth, in the manner provided by section four of this act.

SECTION 13. Upon the expiration of thirty days from the recording of an order of taking as provided by section four of this act by which taking, together with previous purchases or takings as provided by said section four, of land in the towns of Enfield, Greenwich and Prescott, the whole or a substantial part of said towns is taken, and after notice thereof to the towns to be affected by annexation as hereinafter described in this section, the territory within the towns of Enfield, Greenwich and Prescott shall be annexed to the adjacent towns, and to the counties in which such adjacent towns are located in the following manner:

(*a*) There shall be annexed to the town of New Salem, and thereby to Franklin county, those portions of the towns of Prescott, Greenwich and Enfield, being portions of Hampshire county, bounded as follows: beginning at the intersection of the boundary lines of the towns of New Salem, Prescott and Shutesbury and following the existing channel of the west branch of the Swift river in a general southerly direction to its confluence with the Swift river; thence following the existing channel of the Swift river and its middle branch in a general northeasterly direction to the point where it is crossed by the boundary line between the towns of Prescott and Dana; thence following the boundary line between the towns of Prescott and Dana in a general northerly direction to its intersection with the boundary line of the town of New Salem; thence following the boundary line between the towns of New

Salem and Prescott in a general westerly direction to the point of beginning.

(*b*) There shall be annexed to the town of Dana, and thereby to Worcester county, those portions of the towns of Prescott and Greenwich, being portions of Hampshire county, bounded as follows: beginning at the point where the middle branch of the Swift river crosses the boundary line between the towns of Dana and Prescott and following the existing channel of said middle branch in a general southerly direction to its confluence with the east branch of said river; thence following the existing channel of said east branch in a general northeasterly direction to the boundary line between the towns of Greenwich and Hardwick; thence following the boundary line between the towns of Greenwich and Hardwick in a general northeasterly direction to its intersection with the boundary line of the town of Dana; thence following the boundary line between the towns of Dana and Greenwich in a general northerly direction to its intersection with the boundary line of the town of Prescott; thence following the boundary line between the towns of Dana and Prescott in a general northerly direction to the point of beginning.

(*c*) There shall be annexed to the town of Hardwick, and thereby to Worcester county, that portion of the town of Greenwich, being a portion of Hampshire county, bounded as follows: beginning at the most westerly corner stone on the boundary line between the towns of Hardwick and Greenwich located about two thirds of a mile southerly from the outlet of East pond; thence running due west to the existing channel of the east branch of the Swift river; thence following the existing channel of said east branch in a general northeasterly direction to its intersection with the boundary line between the towns of Hardwick and Greenwich; thence following said boundary line between the towns of Hardwick and Greenwich in a general southerly direction to the point of beginning.

(*d*) There shall be annexed to the town of Ware those portions of the towns of Greenwich and Enfield, all of said towns being in Hampshire county, bounded as follows: beginning at the aforesaid most westerly corner stone on the boundary line between the towns of Hardwick and Greenwich located about two thirds of a mile southerly from the outlet of East pond; thence running due west to the existing channel of the east branch of the Swift river; thence following the existing channel of said east branch and of the Swift river in a general southwesterly direction to the intersection of the boundary line of the towns of Ware, Belchertown and Enfield; thence following the boundary line between the towns of Ware and Enfield in a general easterly direction to its intersection with the boundary line of the town of Hardwick; thence following the boundary line between the towns of Hardwick and Enfield in a general northerly direction to its intersection with the boundary line of the town of Greenwich; thence following the boundary line between the towns of Hardwick and Greenwich in a general northerly direction to the point of beginning.

(*e*) There shall be annexed to the town of Belchertown that portion of the town of Enfield, both of said towns being in Hampshire county, bounded as follows: beginning at the intersection of the boundary lines of the towns of Belchertown, Pelham and Enfield; thence running due east to the existing channel of the west branch of the Swift river; thence following the existing channel of said west branch and of the Swift river in a general southerly direction to the boundary line between the towns of Belchertown and Enfield; thence following the boundary line between the towns of Belchertown and Enfield in a general northwesterly direction to the point of beginning.

(*f*) There shall be annexed to the town of Pelham that portion of the town of Enfield, both of said towns being in Hampshire county, bounded as follows: beginning at the intersection of the boundary lines of the towns of Belcher-

town, Pelham and Enfield; thence running due east to the existing channel of the west branch of the Swift river; thence following the existing channel of said west branch in a general northerly direction to the intersection of the boundary lines of the towns of Prescott, Pelham and Enfield; thence following the boundary line between the towns of Pelham and Enfield in a westerly and southerly direction to the point of beginning.

SECTION 14. All the property belonging to the towns of Enfield, Greenwich and Prescott shall upon the annexation of said towns to adjacent towns by authority of this act, vest in and become the property of the commonwealth for the benefit of the metropolitan water district, and the commonwealth shall succeed to all the rights, claims and causes of action of each of said towns, and shall assume and be liable for all the debts, obligations, trusts, duties and liabilities of each of said towns. All actions and causes of actions by or against the said towns of Enfield, Greenwich and Prescott pending or accrued, when such annexation takes effect, shall survive, and may be prosecuted to final judgment and execution by or against the commonwealth. All books, papers, monies and other property in the possession of the treasurer of each of these three towns or of any town officer thereof shall be turned over to the commission at the time of said annexation, and the commission shall wind up and liquidate the affairs of each such town as speedily as possible. Upon the final liquidation of the affairs of the towns of Enfield, Greenwich and Prescott, the commission shall turn over such of the records of said towns respectively as are of permanent value to the towns of Belchertown, Dana and New Salem, respectively, and said records shall be preserved with the records of the town to which they have been so turned over.

Upon such annexation the division of accounts of the

department of corporations and taxation shall audit the books and accounts of the collector of taxes of each of the towns of Enfield, Greenwich and Prescott, respectively, and all taxes assessed for the year of such annexation and remaining uncollected, except taxes assessed upon property acquired by the commission under the second paragraph of section four of this act, to persons residing or property located within the territory annexed to another town shall be, by the assessors of the town in which such taxes were assessed, committed to the collector of taxes of the town to which such territory is by the provisions of this act annexed. It shall be the duty of any collector of taxes to whom any such taxes are committed to complete the collection of such taxes with legal interest and costs and pay over the same to the treasurer of the town for which he is the collector.

Upon the annexation to adjacent towns of the territory within the towns of Enfield, Greenwich and Prescott as set forth in this act, the commission or the metropolitan district commission shall yearly in the month of November reimburse each of said adjacent towns for all money paid out or expenses incurred under the laws of the commonwealth for the year preceding in the relief or aid of persons whose settlement was gained in whole or in part whether by original acquisition or derivation within the territory annexed to each of said towns respectively prior to the date of such annexation.

SECTION 15. Annexation under this act shall constitute the annexed territory part of the town and the county to which it is annexed with respect to the jurisdiction of the courts, as well as for all other purposes. All suits, proceedings, complaints and prosecutions, and all matters of probate, which shall be pending at the time of such annexation before any court or trial justice, or such matters as may be incident thereto, may however be

heard and determined and prosecuted to final judgment and execution before such court or justice as if said annexation had not taken place; but upon such annexation taking place, the several courts and trial justices having jurisdiction over the respective towns to which the territory within said towns of Enfield, Greenwich and Prescott is annexed shall have jurisdiction of all civil actions, matters of probate and insolvency and criminal prosecutions thereafter begun, although the cause of action has accrued, or crime, offense or misdemeanor has been committed, before such annexation, in the same manner and to the same extent as if such territory had been annexed prior to the accrual of the cause of action or the commission of the crime, offense or misdemeanor.

SECTION 16. An inhabitant of the town of Enfield, Greenwich or Prescott, when annexed to an adjacent town by authority of this act, who remains upon the annexed territory, or who removes to a place within the limits of the town to which the land upon which he resided has been annexed, as such limits existed prior to such annexation, shall have the same right to vote at a town meeting in such town, or at an election of town officers, that he would have had if the annexed territory had constituted a part of said town for six months prior to such meeting or election.

SECTION 17. During any interval between the annexation of said towns of Enfield, Greenwich and Prescott and the taking possession of the land taken therein by the commission under this act, the commission shall maintain the public ways, public schools and other public works and public institutions in said towns to such extent and in such manner as the commission may deem necessary for the convenience, comfort and welfare of the inhabitants remaining therein.

SECTION 18. No person shall acquire against the commonwealth any rights by prescription or adverse possession in any lands or rights in lands of the commonwealth

acquired by the commission under the provisions of this act or of chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six.

SECTION 19. The commission may at any time sell at public or private sale, or exchange or lease any property, real or personal, or any easement or water right including any land in new cemeteries provided for in section nine of this act, whether taken by eminent domain or otherwise acquired, which in the opinion of the commission is no longer needed for the purposes of this act. Any sums of money so received shall be applied by the state treasurer to construction costs or to reduce the bonded indebtedness for the works. The commission, and after said works have been turned over to the metropolitan district commission, the metropolitan district commission, may by lease, license or contract permit the construction and maintenance on or over any land or waters under its control, of towers, poles, wires and other structures for the purpose of transmitting electric power, and may construct, maintain and operate such power plants and other structures as may in its opinion be necessary to utilize the fall of water created at any of the dams, channels, tunnels, or other structures under its control, for the production of power or electricity; may locate, construct and maintain lines for transmitting the same; and may use, sell or contract for the sale or use of any power or electricity so created, and any sums of money so received shall be applied to reduce the charges of maintenance of the metropolitan water district.

SECTION 20. The provisions of sections six and seven of chapter fifty-nine of the General Laws shall be applicable to land acquired in fee by the commission under this act for reservoir purposes or for the protection of the reservoir except to land within the present limits of the towns of Enfield, Greenwich and Prescott. On

the land in these three named towns acquired previous to the date of their annexation, the commission shall pay to each said town in which the respective land is located until such time as the annexation of said town, as provided in section thirteen of this act, a sum in lieu of taxes computed and paid as provided in said sections six and seven of said chapter fifty-nine, but including for this period the buildings and structures thereon. Subsequent to said annexation neither the commission nor the metropolitan district commission shall pay any taxes or make any payments in lieu of taxes on land or buildings within the present limits of the said towns of Enfield, Greenwich and Prescott.

As full compensation for any loss of taxation or any other loss caused by the carrying out of the provisions of this act, the commission shall pay to the county of Hampshire the sum of fifty-five thousand dollars, which sum shall be paid at the time of the annexation of the towns of Enfield, Greenwich and Prescott to adjacent towns.

SECTION 21. Whenever by the provisions of this act the commission is required to make annual payments over a period of years, it may by agreement with the parties interested make a settlement by payment of a liquidated amount, if it deems it advisable so to do.

SECTION 22. Any town or fire or water district on the water shed of the Swift river may take from this river above any dam constructed under this act across said river so much of the water thereof as it has already been or may hereafter be authorized by the legislature to take for supplying its inhabitants with water, and in case any such town or district shall hereafter on its application therefor be authorized to take such water, the point of connection with and entrance into said river or any pond, reservoir or waters thereof and the location of any pipes, aqueducts, conduits, wells or other water courses laid or

constructed on land of the commonwealth shall be determined by agreement between such town or district and the metropolitan district commission, and such town or district shall pay to the commonwealth for the account of the metropolitan water district, all damages to the land, structures or other property of the commonwealth caused by such taking, connection or entrance; and it shall further pay to the commonwealth for the account of the metropolitan water district, a fair proportion of the cost incurred by the commonwealth for the acquisition under the provisions of this act of the waters of said river, or rights therein, and for the construction, maintenance and operation of such works and structures as are authorized by this act, including a fair proportion of the cost of maintaining the purity of said water, the said damages and proportion to be determined by the metropolitan district commission and by such applicant town or district, and, if they cannot agree, such damages and proportion shall be determined by a master to be appointed by the supreme judicial court on petition by the commonwealth or said applicant town or district, and the report of the master, when affirmed by said court, shall be final and conclusive upon all parties.

SECTION 23. No persons shall, after the passage of this act, erect a dam for mill purposes across the Swift river, or any of its tributaries above the village of Bondsville, without the consent in writing of the commission, or, after said works have been turned over to the metropolitan district commission, of said metropolitan district commission. In granting its consent, either commission may impose such conditions as it may deem to be for the public interest. Any person who is constitutionally damaged in his property by the refusal of such consent or by the imposition of such conditions, may recover from the commonwealth the damage so caused in the manner provided in section four of this act.

SECTION 24. The supreme judicial court or any justice thereof and the superior court or any justice thereof, during a sitting of the court or in vacation, on the petition of the commission or of any city, town, corporation or person interested, or of the attorney of any such petitioner, shall have jurisdiction in equity or otherwise to enforce the provisions of this act and of any rule, regulation or order made under the authority of the same and to prevent any violation of said provisions, rules, regulations or order; provided, however, that no suit in which the right of the commission to make any taking authorized by this act is questioned shall be brought except in the supreme judicial court for the county in which said taking has been made or is to be made, nor unless the said suit is brought within six months after the passage of this act.

If any part, subdivision or section of this act shall be declared unconstitutional the validity of its remaining provisions shall not be affected thereby.

SECTION 25. All general laws relating to the water supplies of cities and towns or the lands and other property used for such supplies and the provisions of sections ten to twenty-three, inclusive, of chapter ninety-two of the General Laws shall in so far as they are not inconsistent with the provisions of this act apply to and be observed in carrying out the purposes of this act. The provisions of chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six shall continue in force except as modified by the provisions of this act, but nothing in this act shall be held to authorize any taking or diversion of the waters of the Ware river in excess of that authorized under the provisions of said chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six.

SECTION 26. Any church or religious society established in the towns of Dana, Enfield, Greenwich, New Salem or Prescott may within five years from the

passage of this act file in the probate court or in the supreme judicial court for the county in which such town is located a petition in equity representing that by reason of the construction of the reservoirs and other works contemplated by this act it will be impracticable for such church or religious society thereafter to continue its services of worship or otherwise to carry out the purposes for which it was established and thereupon, after such notice to the attorney general and other persons interested as the court in which such petition is filed may direct, said court may authorize such church or religious society to convey by deed all property real and personal held by it for its own purposes or upon any trust (including the beneficial interest in any trust property held for the benefit of such church or religious society, also any and all contingent rights and interests and any right to damages vested in such church or religious society under the terms of chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six or under the terms of this act) to such appropriate person or corporation as the court may determine, to be held and administered by such person or corporation in such manner and upon such trusts as the court may designate and may further direct that upon the making of such conveyance and upon the filing of a certified copy of the deed and of the decree authorizing the same in the office of the secretary of the commonwealth such church or religious corporation shall be deemed to be dissolved. If any property conveyed pursuant to a decree entered upon such petition shall thereafter be taken under the provisions of either of said acts, the person or corporation to which such property shall have been so conveyed shall have the same right to damages as such church or religious society would have had if it had not conveyed such property. Before entering a decree as hereinbefore pro-

vided, the court shall ascertain whether any rights by way of reverter or otherwise are vested in any person or corporation in any property held by or for the benefit of such church or religious society upon the dissolution of such church or religious society, the discontinuance of its activities, its ceasing to use said property or any other contingency, and, if it shall appear that a conveyance of any such property as hereinbefore provided would be inconsistent with any such rights, the court, if any action appears to be necessary in order to effect a lawful and complete disposition of such property, shall direct that the same be conveyed to the person or corporation found to be entitled thereto in the existing state of things or devise a plan for the application thereof in a manner consistent with such rights. The remedies hereby given shall be in addition to any remedies afforded by existing law.

SECTION 27. For the purpose of carrying out the provisions of this act, the commission may expend such amounts not exceeding in the aggregate fifty million dollars, as may from time to time be approved by the governor and council. To meet such expenditures, the state treasurer shall, from time to time, on the request of the commission and subject to such approval, issue bonds of the commonwealth to an amount not exceeding the sum of fifty million dollars, which shall be a further addition to the loans authorized by section eight of chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six, and by section six of chapter one hundred and eleven of the acts of nineteen hundred and twenty-seven.

Such bonds shall be issued as coupon or registered bonds, for such term of years as may be recommended by the governor, in accordance with section three of Article LXII of the amendments to the constitution, and shall bear interest at such rate as shall be fixed by

the state treasurer, with the approval of the governor and council. The amounts necessary to meet interest and serial payment requirements on said bonds and the expenses of maintaining and operating the works to be constructed by the commission under this act, and such other expenses as may be authorized hereunder, shall be added to the annual assessments upon the cities and towns comprising the metropolitan water district and apportioned and collected as provided by section twenty-six of chapter ninety-two of the General Laws.

Approved April 26, 1927.

FILE COPY

FILED
OCT 31 19
CHARLES ELMORE
CL

In the Supreme Court of the United States

OCTOBER TERM, 1929.

No. 12, ORIGINAL. IN EQUITY.

THE STATE OF CONNECTICUT,
Complainant,

v.

THE COMMONWEALTH OF MASSACHUSETTS,
Defendant.

MOTION OF THE COMMONWEALTH OF MASSACHUSETTS TO AMEND ANSWER TO THE BILL OF COMPLAINT.

JOSEPH E. WARNER,
Attorney General of Massachusetts.

BENTLEY W. WARREN,
Special Assistant Attorney General of Massachusetts.

GERALD J. CALLAHAN,
Assistant Attorney General of Massachusetts.

R. AMMI CUTTER,
Assistant Attorney General of Massachusetts.

In the
Supreme Court of the United States

OCTOBER TERM, 1929.

No. 13, ORIGINAL. IN EQUITY.

THE STATE OF CONNECTICUT,
Complainant,

v.

THE COMMONWEALTH OF MASSACHUSETTS,
Defendant.

NOTICE.

To the State of Connecticut, the complainant herein; to the Honorable Benjamin W. Alling, Attorney General of said State; and to Ernest L. Averill, Esq., and to Benedict M. Holden, Esq., both of Hartford, Connecticut, of counsel in said case:

Please take notice that at the incoming of the Supreme Court of the United States at twelve o'clock noon at the Capitol Building in the City of Washington, District of Columbia, on Monday, November 4, 1929, or as soon thereafter as counsel can be heard, the above-named defendant will appear by its attorneys and present to said court the attached motion for leave to file a motion to amend the defendant's answer.

THE COMMONWEALTH OF MASSACHUSETTS,

By JOSEPH E. WARNER,
Attorney General of Massachusetts.

BENTLEY W. WARREN,
Special Assistant Attorney General of Massachusetts.

GERALD J. CALLAHAN,
Assistant Attorney General of Massachusetts.

R. AMMI CUTTER,
Assistant Attorney General of Massachusetts.

THE STATE OF CONNECTICUT.

COUNTY OF

Service of the above notice by the delivery to me of a copy thereof, together with a copy of a motion for leave to file and a motion to amend the defendant's answer is hereby acknowledged this day of October, 1929.

In the
Supreme Court of the United States

OCTOBER TERM, 1929.

No. 13, ORIGINAL. IN EQUITY.

THE STATE OF CONNECTICUT,
Complainant,

v.

THE COMMONWEALTH OF MASSACHUSETTS,
Defendant.

MOTION OF THE COMMONWEALTH OF MASSACHUSETTS FOR LEAVE TO FILE MOTION TO AMEND ANSWER TO THE BILL OF COMPLAINT.

And now comes the Commonwealth of Massachusetts, by Joseph E. Warner, its Attorney General, and moves this Honorable Court for leave to file the attached motion to amend the answer heretofore filed by the said Commonwealth in the above-entitled action.

THE COMMONWEALTH OF MASSACHUSETTS,

By JOSEPH E. WARNER,
Attorney General of Massachusetts.

BENTLEY W. WARREN,
Special Assistant Attorney General of Massachusetts.

GERALD J. CALLAHAN,
Assistant Attorney General of Massachusetts.

R. AMMI CUTTER,
Assistant Attorney General of Massachusetts.

In the Supreme Court of the United States

OCTOBER TERM, 1929.

No. 13, ORIGINAL. IN EQUITY.

THE STATE OF CONNECTICUT,
Complainant,

v.

THE COMMONWEALTH OF MASSACHUSETTS,
Defendant.

MOTION OF THE COMMONWEALTH OF MASSACHUSETTS TO AMEND ANSWER TO THE BILL OF COMPLAINT.

And now comes the Commonwealth of Massachusetts, by Joseph E. Warner, its Attorney General, and moves this Honorable Court for leave to amend the answer heretofore filed by the said Commonwealth in the above-entitled action by leave of court in the following particulars.

1. By striking out that portion of paragraph 5 of the answer beginning with the words "But the defendant", in the twenty-third line on page six of the answer, and ending with the words "more fully described," in the first and second lines on page seven of the answer, and inserting in place thereof the following:

"But the defendant says

(*a*) that no such permit from Congress, the War Department, the Secretary of War, or the Chief of Engineers is necessary for the erection of any structures as such in a non-navigable river or stream.

(*b*) that the United States Government, the War Department thereof, the Secretary of War, and the Chief of Engineers have jurisdiction over the diversion of waters from non-navigable tributaries of navigable streams solely because such a diversion may result in the obstruction of the navigable capacity of a navigable stream into which such non-navigable stream may flow.

(*c*) that it is the duty of the Secretary of War and the Chief of Engineers to grant a permit for a diversion from a non-navigable stream, unless such diversion will result in an unreasonable obstruction of a navigable stream or will unreasonably alter or modify the capacity of the channel of a navigable water of the United States. The defendant admits that at the time of the filing of the bill of complaint in the proceedings before this Honorable Court the defendant had not obtained permission from the War Department or from the office of the Secretary of War of the United States to do any acts actually done or contemplated to be done by the Commonwealth of Massachusetts, referred to in the bill of complaint, for which any permit may be by law required.

The defendant avers, however, —

(*a*) That on November 30, 1927, the Metropolitan District Water Supply Commission made a formal application for a permit to divert water from the Swift river and the Ware river in accordance with the terms of the two acts hereunto annexed and marked 'Appendix A'. No permit was requested for permission to erect any structures in the Swift river or in the Ware river, inasmuch as the said rivers are non-navigable streams and the jurisdiction of the War Department does not extend to regulation of the waters of such streams unless there is such a diversion or use of the waters of such streams as will unreasonably alter or modify the condition or capacity

of the channel of a navigable water of the United States into which such non-navigable streams eventually flow.

(*b*) That after extensive consideration and after public hearings by representatives of the War Department, it was found on March 14, 1928, upon recommendation of the Chief of Engineers and with the approval of the Secretary of War, that the proposed diversion of the waters of the Ware river in excess of 85,000,000 gallons per day (131 cubic feet per second) would have no adverse effect on the navigable capacity of the Connecticut river, and the War Department informed the applicant that no objection would be interposed by the department to the diversion of all flood waters in excess of 85,000,000 gallons per day for the period between October fifteenth and June fifteenth of each year. The application of the Metropolitan District Water Supply Commission of Massachusetts, together with the sixth endorsement thereupon by the Chief of Engineers and the Secretary of War and a copy of a communication submitted to and received by the Metropolitan District Water Supply Commission from the United States Engineer's office at Providence, Rhode Island, are hereunto annexed, marked 'Appendix B,' the said appendix being hereby referred to and made a part hereof.

(*c*) That after extensive consideration and after public hearings it was found by the War Department, upon recommendation of the Chief of Engineers and with the approval of the Secretary of War, on May 11, 1929, that a certain proportion of the diversion of the waters of the Swift river might properly take place without causing any unreasonable, appreciable, or substantial alteration or modification of the condition of, or of the navigable capacity of, the channel of the navigable portion of the Connecticut river, and the Metropolitan District Water Supply Commission

was informed that the War Department would interpose no objection to such a diversion within certain limits. A copy of the application for permission to divert certain waters of the Swift river filed by the Metropolitan District Water Supply Commission, together with the seventh endorsement of the War Department thereon, and a copy of the communication received by the Metropolitan District Water Supply Commission from the office of the District Engineer with respect to said diversion are hereunto annexed and marked 'Appendix C,' to which reference is herein made and which is made a part hereof."

2. By striking out that portion of paragraph 11 of the answer beginning with the words "And further answering," in the fourteenth line on page ten of the answer, and ending with the words "the Secretary of War," in the twenty-second line on page eleven of the answer, and inserting in place thereof the following:

"And further answering the defendant avers that in view of the determination of the Secretary of War, upon recommendation of the Chief of Engineers, that within the limits stated in the annexed findings of the department the proposed diversion of certain of the flood waters of the Ware river and of certain waters of the Swift river contemplated by the said defendant, the Commonwealth of Massachusetts, will have no adverse or injurious effect upon the navigability of the Connecticut river, and in view of the findings of the Chief of Engineers, approved by the Secretary of War, set forth in Appendices 'B' and 'C', attached hereunto and made a part hereof, no question of whether or not any act done or contemplated to be done by the Commonwealth of Massachusetts has or will have an adverse or injurious effect upon the navigability of the Connecticut river is here relevant or

material, in the absence of proof that the Commonwealth of Massachusetts has diverted or actually proposes to divert more water than it is permitted to divert by the terms of the orders of the War Department, inasmuch as the determination of such issues and the protection of the capacity of navigable streams in the interest of interstate and foreign commerce has been committed by the Constitution of the United States to the Congress, which has delegated the greater part of its administrative powers in that behalf to the War Department, to the Secretary of War, and to the Chief of Engineers. The defendant, however, avers that neither the diversions authorized by the Massachusetts legislation, annexed hereunto and made a part hereof and marked 'Appendix A', nor the said diversions as modified in accordance with the terms of the permission contained in the War Department's orders, annexed hereunto and made a part hereof and marked 'Appendix B' and 'Appendix C', will in any way unreasonably alter or modify the navigable capacity of the navigable portion of the Connecticut river; nor will the said diversions either as authorized by the Massachusetts legislation or as modified by the War Department's orders aforesaid cause any damage whatsoever to the health, welfare, safety, or property of the State of Connecticut or the citizens thereof."

3. By striking out so much of paragraph fifth of the answer as begins with the words "Inasmuch as," in the ninth line on page thirty of the answer, and as ends with the words "has no jurisdiction," in the twenty-first line on page thirty of the answer, and inserting in place thereof the following:

"Inasmuch as the duty of protecting the navigability of navigable waters of the United States and

the regulation of obstructions and diminutions of the navigable capacity of such waters has been committed, consistently with the provisions of the Constitution of the United States, by the Congress of the United States in large part to the Secretary of War, the Chief of Engineers, and the War Department, and in view of the determinations and findings of the Chief of Engineers, with the approval of the Secretary of War, as hereinbefore set forth and as more fully set out in said findings in Appendices 'B' and 'C', hereunto annexed and made a part hereof, within the limits provided in said findings, the issue of the effect of the proposed diversions upon the navigability of the Connecticut river is not open in these proceedings, in the absence of proof that the Commonwealth of Massachusetts has diverted or actually proposes to divert more water than it is permitted to divert by the terms of the orders of the War Department. The defendant, however, avers that neither the diversions authorized by the Massachusetts legislation, annexed hereunto and made a part hereof and marked 'Appendix A', nor the said diversions as modified in accordance with the terms of the permission contained in the War Department's orders, annexed hereunto and made a part hereof and marked 'Appendix B' and 'Appendix C', will in any way unreasonably alter or modify the navigable capacity of the navigable portion of the Connecticut river; nor will the said diversions either as authorized by the Massachusetts legislation or as modified by the War Department's orders aforesaid cause any damage what-

soever to the health, welfare, safety, or property of the State of Connecticut or the citizens thereof."

THE COMMONWEALTH OF MASSACHUSETTS,

By JOSEPH E. WARNER,
Attorney General
Of the Commonwealth of Massachusetts.

BENTLEY W. WARREN,
Special Assistant Attorney General
Of the Commonwealth of Massachusetts.

GERALD J. CALLAHAN,
Assistant Attorney General
Of the Commonwealth of Massachusetts.

R. AMMI CUTTER,
Assistant Attorney General
Of the Commonwealth of Massachusetts.

APPENDIX B

NOVEMBER 30, 1927.

WARE RIVER DIVERSION

War Department, United States Engineer Office, 13th Floor, Custom House, Boston, Mass.

GENTLEMEN: — The letter from your department, signed by S. A. Cheney, Colonel, Corps of Engineers, District Engineer, dated November 22, 1927, directed to this Commission in reference to the contemplated diversion of the waters of the Swift and Ware Rivers for the purpose of procuring an additional water supply for the Metropolitan District received.

The diversion of waters referred to is of the Ware River authorized by Chapter 375 of the Acts of 1926 (Massachusetts) and of the Swift River authorized by Chapter 321 of the Acts of 1927 (Massachusetts), both rivers being entirely within the State of Massachusetts and being non-navigable. Copies of both of these Acts are attached hereto.

In accordance with the letter from your department and as suggested by Colonel Cheney in a recent conference, this Commission hereby makes formal application for a permit for the diversion of the waters of the Ware River in accordance with the terms of Chapter 375 of the Acts of 1926 which provides so far as said diversion is concerned as follows:

> SECTION 1, Paragraph 2 — "The commission, on behalf of the commonwealth, shall forthwith for the purpose of extending and increasing the water supply of the metropolitan water system, and of such cities and towns not members of the metropolitan water district as may hereafter require water from said system, divert into the Wachusett reservoir of said district the flood waters, as defined in section four, of the Ware river at a point in the town of Oakham or the

town of Barre not more than one mile from the bridge of the Boston and Albany railroad crossing said river in the village of Coldbrook, and construct as a part of the metropolitan water system, such works as may be necessary for such extension and increase, and all structures and appurtenances incidental or complementary thereto; provided, that said flood waters shall not be so diverted between May thirty-first and December first in any year unless such diversion be first approved by the state department of public health."

SECTION 4, Paragraph 1 — "For the purposes of this act, the flood waters of the said Ware river which the commission is authorized to divert as provided in section one are hereby defined to be the waters thereof at and above the point of diversion established under section one in excess of a flow of eighty-five million gallons a day, meaning thereby that on any day when the natural flow of said river is less than eighty-five million gallons no water shall be diverted."

This matter was taken up by Mr. Winsor, Chief Engineer of this Commission, with Major Fowler of the Providence office early in the year, and it was our impression that if anything further was required on the part of the War Department, we would be notified. Work has been going on since that time and in view of the immediate necessity of the Boston Metropolitan District for an additional water supply, and the serious danger of a water shortage unless this work is prosecuted to the earliest possible completion, we cannot too strongly urge that a permit be immediately granted.

Respectfully,

METROPOLITAN DISTRICT WATER
SUPPLY COMMISSION,

By (Sgd) DAVIS B. KENISTON,
Chairman.

Incls:
DBK : CH

COPY

7510 (Mass. Metro. Dist. Water Comm.) 1. Subject: Application for permission to divert water from Ware River, Mass.

6TH IND.

Office, C. of E. March 6, 1928. — To the Secretary of War.

1. The Metropolitan District Water Supply Commission of the State of Massachusetts has made application for permits to divert excess waters from Ware River and the major part of the flow of the Swift River for an additional water supply for the Boston Metropolitan District. The particular application under consideration in this indorsement refers to the excess waters of the Ware River.

2. Both rivers lie wholly within the State of Massachusetts. They rise in the central part of the State, flow in a southerly direction and uniting with the Quaboag River, form the Chicopee River. The latter flows westward to the Connecticut River.

3. Both applications contemplate the transfer from the Connecticut basin of a portion of the waters naturally tributary thereto, and their diversion through a tunnel to another watershed. In the case of the Swift River it is proposed to construct a storage reservoir and a very large proportional diversion is requested. The application for the Swift River requires further detailed study to arrive at a close determination of its effects on the navigable capacity of the Connecticut. These studies have not progressed sufficiently to enable me to state at this time the amount of allowable diversion or exact conditions under which diversion may be possible without adverse effect on the Connecticut. No storage is proposed in the case of the Ware River and no diversion except when the flow is in excess of 85,000,000 gallons per day (about 131 cubic feet per

second), with the proviso that no water shall be diverted between May 31 and December 1 in any year unless first approved by the State Department of Public Health. The proposed Swift River diversion presents a complicated question. The Ware River application involves no unusual difficulties.

4. The drainage area of the Swift River above the lower end of the reservoir, is about 186 square miles. The drainage area of the Ware above the proposed point of diversion is about 98 square miles. The drainage area of the Connecticut is about 11,000 square miles.

5. Objections to the proposed diversion have been presented both in writing and orally by representatives of the State of Connecticut, the City of Hartford and the Hartford and New York Transportation Company. The Division Engineer has raised the question of the adverse effect on power development at Enfield Rapids, Conn. The State of Connecticut has instituted an action in the Supreme Court of the United States to restrain the taking of any part of the waters of the Ware, Swift and other rivers, basing its contention only incidentally on adverse effects on navigable capacity of the Connecticut.

6. After a study of the Ware River application had been made, the District Engineer of the Providence District held a public hearing at Springfield, on the 9th ultimo to give the States of Massachusetts and Connecticut and all interested parties opportunity to present their views. At the hearing no attempt was made by either side to controvert the finding set forth in the notice of hearing that the navigable depth of the Connecticut will not be affected by diversion between October 15 and June 15 except to the extent of an average of 0.6 of a day per year. . . .

7. The records of discharge of the Ware River for the years 1913–1926 indicate that a volume of flow in excess

of 131 cubic feet per second at the proposed point of diversion did not occur on any day between October 15 and June 15 of those years when the Hartford gauge at 8 a.m. was below 2 feet. The same records indicate that a volume of flow in excess of 131 cubic feet at the proposed point of diversion has occurred only on an average of 0.7 of a day per year when the Hartford gauge at 8 a.m. was below 3 feet. The maximum amount thus capable of diversion occurred on December 15, 1924, when the volume of flow was 170 cubic feet per second and the gauge reading at Hartford was 2.7 feet. The possible amount that could then have been diverted was 39 cubic feet per second. The effect on gauge heights or navigable depths by the diversion of that amount would be imperceptible. These flashy and insignificant occurrences on the Ware are not reflected by the gauge at Hartford as much as are wind and tide effects. . . .

8. . . . In my judgment the use of excess waters from the Ware, as outlined above, will not have any injurious effect on navigation irrespective of any diversion which may be authorized from the Swift. Furthermore a proper regulation of the Swift River by storage of flood waters may be actually beneficial by making possible an increase of flow during dry periods. By careful and economical usage flood stages may be slightly lowered, navigable depth slightly benefited and diversion of reasonable amounts for water supply made feasible.

9. The applicant is very desirous of a decision concerning the Ware River application as soon as possible. So far as the interests committed to this Department are concerned, I see no reason for deferring action in the case. In my opinion the proposed diversion of waters in excess of 85,000,000 gallons per day (131 cubic feet) will have no adverse effect on the navigable capacity of the Connecticut River. In view of the controversy before the Supreme Court, it seems inadvisable

to issue a formal permit for the present but to inform the applicant that no objection will be interposed by the War Department to the diversion of the flood waters exceeding 85,000,000 gallons per day for the period October 15 to June 15, of each year. Approval of this course of action is recommended.

(Signed) EDGAR JADWIN
Major General,
Chief of Engineers.

Approved March 14, 1928

(Signed) DWIGHT F. DAVIS,
Secretary of War.

War Department
United States Engineer Office
Providence, R. I.

Refer to file No. Comm. 64/1-104 March 19, 1928.

Metropolitan District Water Supply Commission, The Commonwealth of Massachusetts, 24 School Street, Boston, Massachusetts.

Gentlemen: — Referring to your application of November 30, 1927, for federal authority for the diversion of the flood waters of the Ware River for an additional water supply for the Boston Metropolitan District, this office has been directed by the Chief of Engineers to inform you that no objection will be interposed by the War Department to the diversion of the flood waters of the Ware River exceeding 85,000,000 gallons per day for the period October 16 to June 15 each year.

For and in the absence of Colonel S. A. Cheney, Corps of Engineers, District Engineer.

Very respectfully,

THOS. R. McELROE (Sgd.)
Chief Clerk.

APPENDIX C

NOVEMBER 30, 1927.

SWIFT RIVER DIVERSION

War Department, United States Engineer Office, 13th Floor, Custom House, Boston, Massachusetts.

GENTLEMEN: — The letter from your department signed by S. A. Cheney, Colonel, Corps of Engineers, District Engineer, dated November 22, 1927, directed to this Commission in reference to the contemplated diversion of the waters of the Swift and Ware Rivers for the purpose of procuring an additional water supply for the Metropolitan District received.

The diversion of waters referred to is of the Ware River authorized by Chapter 375 of the Acts of 1926 (Massachusetts) and of the Swift River authorized by Chapter 321 of the Acts of 1927 (Massachusetts), both rivers being entirely within the State of Massachusetts and being non-navigable. Copies of both of these Acts are attached hereto.

In accordance with the letter from your department and as suggested by Colonel Cheney in a recent conference, this Commission hereby makes formal application for a permit for the diversion of the waters of the Swift River in accordance with the terms of Chapter 321 of the Acts of 1927 which provides so far as said diversion is concerned as follows:

> SECTION 1, 1st Paragraph — "The metropolitan district water supply commission, established by chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six, hereinafter referred to as the commission, on behalf of the commonwealth, shall forthwith, for the purpose of adding to, extending and further developing the additional

sources of water supply of the metropolitan water system provided for in said chapter three hundred and seventy-five, divert into the Wachusett reservoir of the metropolitan water system the waters of the Swift River, and of Beaver brook, a tributary of the Ware river, by the construction of an extension, to the Swift river, of the aqueduct or tunnel between the Wachusett reservoir and the Ware river at or near Coldbrook provided for in said chapter three hundred and seventy-five, and by the construction of a temporary diversion dam as may be required at a point on the Swift river below the confluence of the east and middle branches or at a point on the east branch near the village of Greenwich, and ultimately by the construction of a dam across the Swift river at or near the boundary line between the towns of Ware and Enfield, and of a dam across Beaver Brook at or near said boundary line, thereby creating a storage reservoir in the Swift river valley. No water shall be diverted or stored in any calendar day when the flow of the Swift river at or just above the village of Bondsville in the towns of Palmer and Belchertown is less than twenty million gallons; and there shall be discharged from any storage created by the commission above said village a sufficient amount of water to maintain, so far as such storage will allow, a flow of said river at said village of not less than twenty million gallons in each calendar day."

This matter was taken up by Mr. Winsor, Chief Engineer of this Commission, with Major Fowler of the Providence office early in the year, and it was our impression that if anything further was required on the part of the War Department, we would be notified. Work has been going on since that time and in view of the immediate necessity of the Boston Metropolitan District for an additional water supply, and the serious

danger of a water shortage unless this work is prosecuted to the earliest possible completion, we cannot too strongly urge that a permit be immediately granted.

Respectfully,

METROPOLITAN DISTRICT WATER
SUPPLY COMMISSION,

By (sgd) DAVIS B. KENISTON,
Chairman.

Encls.
DKB: CH (Pw)

NOVEMBER 30, 1927.

WARE AND SWIFT RIVER DIVERSIONS.

War Department, United States Engineer Office, 13th Floor, Custom House, Boston, Massachusetts.

GENTLEMEN: — Supplementing the applications of November 30 from this Commission to the War Department for permits for the Swift and Ware River diversions, your attention is directed to the correspondence now in your files between Major R. F. Fowler, Corps of Engineers, District Engineer at Providence, and Frank E. Winsor, Chief Engineer of this Commission, covering the period from January 25 to March 9, 1927. This Commission inferred from this correspondence that the War department had taken or would take the view that the proposed diversion from the Ware River would be no detriment to the navigable depth of the Connecticut River and that the proposed diversion from the Swift River would not be objected to unless or until the War Department, after taking into account various other factors influencing the flow of the Connecticut, such as storage held and released by mills, power companies, etc. in ponds and storage reservoirs, should demonstrate that such diversion would reduce the navigable depth, in which case the War Department might require greater quantities to be released from time to time during the dry season.

The diversion of both the Swift and Ware Rivers is essentially one project so far as a practical and economical development of an additional water supply for the Boston Metropolitan District is concerned.

The Ware River diversion in effect skims off the flow as it occurs in excess of 85,000,000 gallons, which is equivalent to 1.34 cubic feet per second per square mile from the approximate 98 square miles of drainage area affected (prior to a recent survey this area was assumed

to be about 100 square miles). This flow of 1.34 cubic feet per second unaffected by the diversion is several times the average dry weather flow of the Ware River.

The Swift River diversion is from about 186 square miles and there is guaranteed a flow in the Swift River at Bondsville, about five miles below the proposed Swift River Reservoir, of 20,000,000 gallons a day, the drainage area at Bondsville being about 195 square miles. The guaranteed flow is 0.16 cubic feet per second per square mile. The drainage area of 186 square miles is 1.71% of the drainage area of the Connecticut River of 11,400 square miles and from this 186 square miles sufficient water is released to insure a flow of 0.16 cubic feet per second per square mile from 195 square miles of drainage area. There will be no reduction but a slight increase in the flow of the Swift River in the driest times and during the usual dry season the average reduction in flow of the Connecticut River will correspond to a reduction of drainage area of that river not greater than one per cent. The effect on the flow of the Connecticut River of so small a diversion will, it is believed, be immeasurable so far as reducing the navigable depth is concerned.

During the past year the Commission has expended a large amount of money on the Ware and Swift River projects, including the cost of sinking of shafts preparatory to the construction of the tunnel which is necessary for making available the flood waters of the Ware River. Satisfactory bids for the construction of the tunnel itself were received on November 18. This contract if awarded in the immediate future and if completed in the time specified will permit the diversion of Ware River water into the Wachusett Reservoir in the winter or spring of 1931, before which time no water can be diverted. To suspend operations at this time would not only involve the Commonwealth in a heavy financial loss, but would also delay procuring the additional supply of water badly needed by the Metropolitan District at the earliest possible date.

The Swift River diversion cannot be begun until the tunnel is extended from the Ware River to the Swift River and it is estimated that the earliest time at which water could be diverted from the Swift River would be during 1933.

There is inclosed herewith preliminary blueprint of plan, Accession 617, being a general plan of the Metropolitan Water Supply.

Respectfully,

METROPOLITAN DISTRICT WATER
SUPPLY COMMISSION,

By (Sgd) DAVIS B. KENISTON,
Chairman.

FEW : AW
Inclosure

COPY

7510 (Mass. Metro. Dist. Water Supply Com.) 2. Subject: Swift River Diversion.

7TH IND.

Office, C. of E., May 9, 1929. — To the Secretary of War.

1. On November 30, 1927, the Metropolitan District Water Supply Commission of Boston, at the written suggestion of the District Engineer, Providence District, made a formal application for a permit to divert water from the Swift River, Massachusetts, in accordance with the terms of Chapter 321 of the Acts of 1923 of that State. On the same date, the Commission also made application for a permit to divert water from the Ware River, Massachusetts, in accordance with the terms of Chapter 375 of the State Acts of 1926.

2. Those rivers rise in the central region of Massachusetts and flow southerly and westerly to a junction forming the Chicopee River which flows westerly and empties into the Connecticut at a point about 9.5 miles north of the boundary between Massachusetts and Connecticut.

3. On March 14, 1928, the Secretary of War approved a recommendation of the Chief of Engineers that the applicant be informed that no objection would be interposed by the War Department to the diversion from the Ware River of the flood waters exceeding 85,000,000 gallons per day for the period October 15 to June 15, of each year. This approval was given by the Secretary of War with the understanding that such action would not affect the consideration of the Swift River application.

4. The Swift River application contemplates the storage of its flow and its possible diversion with the exception of 20,000,000 gallons of water per day into the Wachusett Reservoir, situated about 30 miles eastward

of the point of diversion and in another watershed. Storage would be provided first by a temporary dam to be constructed below the confluence of the east and middle branches of the Swift River or at a point on the east branch near the village of Greenwich, and ultimately by the construction of a dam across the Swift River at or near the boundary of Ware and Enfield, and of a dam across Beaver Brook at or near said boundary line.

5. No permit is required for any of the diversion structures as the Swift River and its various branches, as well as Beaver Brook, are non-navigable streams. The jurisdiction of the War Department in cases of this kind begins when the appropriation or regulation of the waters of a non-navigable tributary is of such extent as "to alter or modify the . . . condition or capacity of . . . the channel of any navigable water of the United States". Since such alteration or modification without previous recommendation and authorization of the Chief of Engineers and the Secretary of War is unlawful, the War Department is interested in determining whether the amount of such appropriation or regulation would probably demand institution of Federal proceedings to preserve substantially the navigability of navigable waters.

6. This particular case has been studied in great detail during the past 17 months by the District Engineer at Providence, the Division Engineer at New York and the Office of the Chief of Engineers. Full opportunity has been given to the representatives of the Metropolitan District Water Supply Commission and of the State of Connecticut and other interested parties, to present data and to inform themselves of the progress of these studies.

7. The State of Connecticut presented objections based on both legal and engineering grounds. All such legal questions have been answered so far as concerns the interests entrusted to the Department. No attempt has been made to answer the fundamental questions of

law involved as to the right to divert water from one watershed to another, inasmuch as the State of Connecticut has instituted an action in the Supreme Court of the United States to restrain the taking of any part of the water of the Ware, Swift and other rivers. It is believed that the decision of such issues should be left to that tribunal. The objections which have been raised on engineering or navigation grounds are referred to later in this indorsement.

8. The watershed of the Connecticut River above the Massachusetts-Connecticut boundary is 9,915 square miles. The drainage area of the Swift River involved in this application is approximately 186 square miles. The mean annual discharge of the Connecticut River at the State Line is about 17,000 cubic feet per second and the mean annual discharge of the Swift River at the proposed dam site, about 300 cubic feet per second. The discharges of both rivers are affected and regulated to a considerable extent by mill and power dams which temporarily store water to suit occupational uses. The stage of the river at Hartford is indicated by a gauge at that point. The surface elevations are affected by tide and wind. The best information of normal flow conditions of the Connecticut River is afforded by the records of the United States Geological Survey gauge at Sunderland, Massachusetts, located on that river about as far above Hartford as the site of the proposed dam on the Swift River. Study of the gauge records indicate that critical stages normally occur between June 15 and November 15. The critical period for navigation is taken as from June 1 to November 30.

9. The legislation of the State of Massachusetts prescribes that there shall be maintained a minimum flow of water of 31 cubic feet per second at Bondsville at a gauge located on the Swift River below the site of the proposed impounding dam, and where the tributary drainage area is 8 square miles in excess of that above that dam.

10. The results of the studies made by and under the direction of this office were submitted for comment to the representatives of the Metropolitan Water Supply District of Boston and to the representatives of the State of Connecticut. Both groups were in this office many times in discussions and conferences on both the legal phases and the navigation features of the case. In general, the representatives of Massachusetts indicated originally the opinion that the Office of the Chief of Engineers was magnifying the effect on navigation of the proposed appropriation of water in excess of 31 cubic feet per second. They stressed the desirability of early action by the Department to define the limits beyond which Massachusetts could not appropriate water without violating the provisions of the River and Harbor Act of March 3, 1899. On the other hand, the representatives of the State of Connecticut claimed that the proposals of the Department would not assure a 2-foot stage on the Hartford gauge; furthermore, that the maintenance of a 3-foot gauge rather than a 2-foot gauge was a better measure of the navigable capacity of the Connecticut River. Principally, however, the representatives of Connecticut strongly urged against any action positive or negative or inferential which permitted or which would permit or acquiesce to any degree in any diversion from the watershed of the Connecticut River to any other watershed.

11. The applicant is very desirous of obtaining a definite statement as to the limits of appropriation of water from the non-navigable Swift River which may be possible without substantially altering the condition or capacity or the channel of the navigable Connecticut River. In addition to the exhaustive study of the engineering data pertinent to the interests committed to the War Department, this office has taken into consideration the possible bearing upon Department action in this matter of the decisions of the Supreme Court in the cases of the United States *vs.* Rio Grande Dam

Irrigation Company and of the State of Wisconsin and other states *vs.* the State of Illinois and Sanitary District of Chicago, both of which involve questions regarding diversions affecting navigable waters. In the action hereinafter suggested, it is felt that the proposed position of the War Department will in no way prejudice the litigation now pending before the Supreme Court.

It is recommended that the applicant be informed as follows:

(a) It is the duty of the War Department to institute proceedings to preserve the substantial navigability of navigable waters of the United States when the appropriation or regulation of the waters of a non-navigable tributary affects, substantially alters or modifies the condition or capacity of the channel of a navigable water.

(b) The War Department is unwilling to admit that the appropriation of water from the Swift River to the extent proposed in this application might not, on occasion, have an appreciable effect on the navigable capacity of the Connecticut River.

(c) Limited amounts of water may be appropriated from the Connecticut River basin above the Connecticut-Massachusetts State Line, without substantially diminishing the navigability of that stream within the limits of present navigability.

(d) It is found that a discharge of 4,900 cubic feet per second at Sunderland, Massachusetts, corresponds to average lower low tide gauge height of 2.1 at Hartford, Connecticut and that a discharge of 4,650 cubic feet per second at Sunderland corresponds to an average lower low tide gauge height of 2.0 at Hartford.

(e) From the studies of past records it appears there will be no substantial alteration or modification of the condition or navigable capacity of the channel of the navigable portion of the Connecticut River if the flow of water from the Swift River as provided in

the terms of Chapter 321, of the Acts of 1927 (Massachusetts) be augmented during the critical period from June 1 to November 30, both inclusive, so that the measured rate of discharge on the Swift River shall be 70 cubic feet per second on such days as the United States Geological Survey gauge at Sunderland, Massachusetts indicates the discharge of the Connecticut River at that point to be less than 4900 cubic feet per second and more than 4650 cubic feet per second and shall be further augmented so that the measured rate of discharge past the impounding dam on the Swift River shall be 110 cubic feet per second on such days as the Geological Survey gauge at Sunderland Massachusetts indicates the discharge on the Connecticut River at that point to be 4650 cubic feet per second or less.

(f) The rates of discharge set forth in subparagraph (e) are subject to review based on more complete data which may become available in the future.

12. Approval of this course of action is recommended.

[M. & R. DIV. (s) EDGAR JADWIN
May 10, 1929
Off. Sec. War]

EDGAR JADWIN,
Major General,
Chief of Engineers.

1 Inclo. viz;
Map showing proposed
plan of diversion.

Recommendation of 7th indorsement approved May 11, 1929.

[M & R Div. (s) JAMES W. GOOD,
May 11, 1929 *Secretary of War.*
Off. Sec. War[

Sub. 2/6 accpg.

MAY 11, 1929.

COPY

Address Reply to
THE DISTRICT ENGINEER
Room 419, New Federal Building
Providence, R. I.

WAR DEPARTMENT
UNITED STATES ENGINEER OFFICE
Providence, R. I.

MAY 17, 1929.

Refer to File No. Conn. 54/1-166

Metropolitan District Water Supply Commission, 24 School Street, Boston, Mass.

GENTLEMEN: — With reference to your application of November 30, 1927 for a permit to divert water from the Swift River, Massachusetts, in accordance with the terms of Chapter 321 of the Acts of 1923 of that State, I have been directed by the Chief of Engineers under date of May 13 to inform you as follows:

(a) It is the duty of the War Department to institute proceedings to preserve the substantial navigability of navigable waters of the United States when the appropriation or regulation of the waters of a non-navigable tributary affects, substantially alters or modifies the condition or capacity of the channel of a navigable water.

(b) The War Department is unwilling to admit that the appropriation of water from the Swift River to the extent proposed in this application might not, on occasion, have an appreciable effect on the navigable capacity of the Connecticut River.

(c) Limited amounts of water may be appropriated from the Connecticut River basin above the Connecticut–Massachusetts State Line, without substantially diminishing the navigability of that stream within the limits of present navigability.

(d) It is found that a discharge of 4900 cubic feet per second at Sunderland, Massachusetts, corresponds to average lower low tide gauge height of 2.1 at Hartford, Connecticut and that a discharge of 4650 cubic feet per second at Sunderland corresponds to an average lower low tide gauge height of 2.0 at Hartford.

(e) From the studies of past records it appears there will be no substantial alteration or modification of the condition or navigable capacity of the channel of the navigable portion of the Connecticut River if the flow of water from the Swift River as provided in the terms of Chapter 321, of the Acts of 1927 (Massachusetts) be augmented during the critical period from June 1 to November 30, both inclusive, so that the measured rate of discharge on the Swift River shall be 70 cubic feet per second on such days as the United States Geological Survey gauge at Sunderland, Massachusetts indicates the discharge of the Connecticut River at that point to be less than 4900 cubic feet per second and more than 4650 cubic feet per second and shall be further augmented so that the measured rate of discharge past the impounding dam on the Swift River shall be 110 cubic feet per second on such days as the Geological Survey gauge at Sunderland, Massachusetts indicates the discharge on the Connecticut River at that point to be 4650 cubic feet per second or less.

(f) The rates of discharge set forth in subparagraph (e) are subject to review based on more complete data which may become available in the future.

Very respectfully,

(Signed) F. S. SKINNER
Major, Corps of Engineers,
District Engineer.

FILE COPY

FILED
JAN 15 193
CHARLES ELMORE CR
CLE

In the
Supreme Court of the United States.

OCTOBER TERM, 1929.

ORIGINAL NO. ~~13~~. 12

IN EQUITY.

THE STATE OF CONNECTICUT

v.

THE COMMONWEALTH OF MASSACHUSETTS.

REPRINT OF ANSWER OF DEFENDANT

THE COMMONWEALTH OF MASSACHUSETTS, INCLUDING AMENDMENTS ALLOWED DECEMBER 2, 1929.

JOSEPH E. WARNER, *Attorney General*
Of the Commonwealth of Massachusetts,

BENTLEY W. WARREN,
Special Assistant Attorney General
Of the Commonwealth of Massachusetts,

GERALD J. CALLAHAN,
R. AMMI CUTTER,
Assistant Attorneys General
Of the Commonwealth of Massachusetts,
Attorneys for the Defendant.

In the
Supreme Court of the United States.

OCTOBER TERM, 1929.

ORIGINAL NO. 13.

IN EQUITY.

STATE OF CONNECTICUT

v.

THE COMMONWEALTH OF MASSACHUSETTS.

MOTION FOR LEAVE TO FILE REPRINT OF ANSWER.

And now comes the defendant in the above-entitled case and moves for leave to file a reprint of the answer heretofore filed by leave of court on March 5, 1928, revised so as to include the amendments allowed by leave of court on December 2, 1929. The said amendments have been consolidated with the material in the original answer and certain minor errata have been corrected.*

JOSEPH E. WARNER,
Attorney General
of the Commonwealth of Massachusetts.

BENTLEY W. WARREN,
Special Assistant Attorney General
of the Commonwealth of Massachusetts.

GERALD J. CALLAHAN,
R. AMMI CUTTER,
Assistant Attorneys General
of the Commonwealth of Massachusetts.

* These corrections involve merely the headings of the letters in Appendices "B" and "C", appearing, *infra*, pp. 81, 89, 92.

In the
Supreme Court of the United States.

OCTOBER TERM, 1929.*

No. 13. ORIGINAL. IN EQUITY.

THE STATE OF CONNECTICUT,
Complainant,

v.

THE COMMONWEALTH OF MASSACHUSETTS,
Defendant.

ANSWER TO THE BILL OF COMPLAINT.†

And now comes the Commonwealth of Massachusetts by Joseph E. Warner, its Attorney General,‡ and for answer to the bill of complaint heretofore filed by leave of court by the State of Connecticut says as follows:

1. The defendant admits the material allegations of fact, if any such there be, contained in the first paragraph of the bill of complaint, set forth on page one of the printed bill.

2. Answering the second paragraph, set forth on page two of the printed bill of complaint, the defendant admits that the State of Connecticut was one of the "Thirteen Original Colonies" and that said State was a party to the original adoption of the Constitution of the United States; that said State, through its duly constituted authorities, has exercised sovereign power under said Constitution over such lands, waters, and other prop-

* October term 1927, No. 14.

† Original answer filed by leave of court on March 5, 1928.

‡ Succeeding Arthur K. Reading, resigned June 6, 1928.

erties as are now comprised within the territorial limits of the State of Connecticut since the adoption of such Constitution, but the defendant says that such sovereign power of the State of Connecticut is subject to the superior power of the Government of the United States in so far as regulatory power is given to the Government of the United States under the Constitution of the United States. As to whether or not said State has succeeded to all the rights, properties, duties, and obligations created by charter granted in 1662 by King Charles the Second, King of Great Britain, the defendant is ignorant and says that if the allegations to that effect are material allegations of fact it can neither affirm nor deny the same, but leaves the complainant to prove the same if and in so far as they may be material. The defendant denies that a great portion of the Connecticut River is included within the territorial limits of the State of Connecticut and that all of the portion of said river actually so included is navigable.

3. Answering the third paragraph set forth on pages two and three, of the printed bill of complaint, the defendant admits that it was one of the original Colonies and was a party to the Constitution of the United States; that at the time of the adoption of said Constitution the said defendant was a body politic organized for the usual governmental purposes and exercising sovereignty over the territory within its then defined limits, which included a portion of the Connecticut River and a portion of many of the tributaries of said river, including those specifically set out in said third paragraph of the bill of complaint. The defendant denies that the Swift River, the Ware River, and the Quaboag River flow directly into the Connecticut River, but avers that the Swift River flows into the Ware River about seven-tenths (7/10) of a mile above the village of Three Rivers in the town of Palmer, at which village the Quaboag

flows into the joint waters of the Ware and Swift rivers, forming as a result of said confluence a river known as the Chicopee River, which flows in a general westerly direction about seventeen miles emptying then directly into the Connecticut River. The defendant denies that the waters of all or any of said tributaries are necessary to maintain and preserve the flow of said Connecticut River.

4. Answering the fourth paragraph, set forth on page three, of the printed bill of complaint, the defendant denies each and every material allegation of fact therein contained, if any such there be, except that the defendant admits that the Commonwealth of Massachusetts has exclusive control and power of regulation of all water within its territorial limits and that such sovereignty over the waters within the territorial limits of the said State of Connecticut and of the Commonwealth of Massachusetts as may be exercised by the respective State and Commonwealth is subject to such rights as have been conferred upon the United States of America by the Constitution of the United States in the interests of interstate commerce and for the protection of the navigability of streams, wherever the same may be situated. The defendant further says that if the law of the State of Connecticut with respect to the control and power of regulation of the waters within the territorial limits of said State is here material, the defendant is ignorant of the same and leaves the complainant to prove the same in so far as it may be material. And further answering the defendant says that by the law both of the Commonwealth of Massachusetts and of the State of Connecticut owners of riparian lands are entitled to make reasonable and equitable use of the waters of streams flowing by or through their lands providing that such use is not inconsistent with a similar reasonable and equitable use of the said stream by lower riparian owners.

5. Answering the fifth paragraph, set forth on pages three and four, of the printed bill of complaint, the defendant admits that the United States of America, acting under the authority of the Constitution of the United States, by virtue of various acts of the Congress of the United States, has assumed the care and control of navigable rivers and has placed the greater portion of the duty of exercising such control in the War Department of the United States Government and the office of the Secretary of War; but the defendant denies that any acts and things which have been in fact done or which are in fact planned by the Commonwealth of Massachusetts, complained of in said bill of complaint, constitute in any way an interference with interstate commerce by affecting the navigability of the said Connecticut River, or that, in so far as concerns any rights or interests of the State of Connecticut or of the people thereof, there is any necessity that permission should be obtained from the War Department and the office of the Secretary of War of the United States before any of the acts and things heretofore actually done or hereafter actually contemplated to be done by the Commonwealth of Massachusetts, referred to in said bill of complaint, may be lawfully done by the Commonwealth of Massachusetts, [* but the defendant says

(*a*) that no such permit from Congress, the War Department, the Secretary of War, or the Chief of Engineers is necessary for the erection of any structures as such in a non-navigable river or stream.

(*b*) that the United States Government, the War Department thereof, the Secretary of War, and the Chief of Engineers have jurisdiction over the diversion of waters from non-navigable tributaries of navigable streams solely because such a diversion may result in the

* Text in brackets inserted by amendment, allowed December 2, 1929.

obstruction of the navigable capacity of a navigable stream into which such non-navigable stream may flow.

(*c*) that it is the duty of the Secretary of War and the Chief of Engineers to grant a permit for a diversion from a non-navigable stream, unless such diversion will result in an unreasonable obstruction of a navigable stream or will unreasonably alter or modify the capacity of the channel of a navigable water of the United States. The defendant admits that at the time of the filing of the bill of complaint in the proceedings before this Honorable Court the defendant had not obtained permission from the War Department or from the office of the Secretary of War of the United States to do any acts actually done or contemplated to be done by the Commonwealth of Massachusetts, referred to in the bill of complaint, for which any permit may be by law required.

The defendant avers, however, —

(*a*) That on November 30, 1927, the Metropolitan District Water Supply Commission made a formal application for a permit to divert water from the Swift river and the Ware river in accordance with the terms of the two acts hereunto annexed and marked "Appendix A." No permit was requested for permission to erect any structures in the Swift river or in the Ware river, inasmuch as the said rivers are non-navigable streams and the jurisdiction of the War Department does not extend to regulation of the waters of such streams unless there is such a diversion or use of the waters of such streams as will unreasonably alter or modify the condition or capacity of the channel of a navigable water of the United States into which such non-navigable streams eventually flow.

(*b*) That after extensive consideration and after public hearings by representatives of the War Department, it was found on March 14, 1928, upon recommendation of the Chief of Engineers and with the approval of the

Secretary of War, that the proposed diversion of the waters of the Ware river in excess of 85,000,000 gallons per day (131 cubic feet per second) would have no adverse effect on the navigable capacity of the Connecticut river, and the War Department informed the applicant that no objection would be interposed by the department to the diversion of all flood waters in excess of 85,000,000 gallons per day for the period between October fifteenth and June fifteenth of each year. The application of the Metropolitan District Water Supply Commission of Massachusetts, together with the sixth endorsement thereupon by the Chief of Engineers and the Secretary of War and a copy of a communication submitted to and received by the Metropolitan District Water Supply Commission from the United States Engineer's office at Providence, Rhode Island, are hereunto annexed, marked "Appendix B," the said appendix being hereby referred to and made a part hereof.

(*c*) That after extensive consideration and after public hearings it was found by the War Department, upon recommendation of the Chief of Engineers and with the approval of the Secretary of War, on May 11, 1929, that a certain proportion of the diversion of the waters of the Swift river might properly take place without causing any unreasonable, appreciable, or substantial alteration or modification of the condition of, or of the navigable capacity of, the channel of the navigable portion of the Connecticut river, and the Metropolitan District Water Supply Commission was informed that the War Department would interpose no objection to such a diversion within certain limits. A copy of the application for permission to divert certain waters of the Swift river filed by the Metropolitan District Water Supply Commission, together with the seventh endorsement of the War Department thereon, and a copy of the communication received by the Metropolitan District Water Supply

Commission from the office of the District Engineer with respect to said diversion are hereunto annexed and marked "Appendix C," to which reference is herein made and which is made a part hereof.] The defendant denies that any diversion of the waters of any other river in the watershed of the Connecticut River is contemplated or planned by it. The defendant denies each and every other material allegation of fact in said fifth paragraph of the bill of complaint, if any such there be.

6. Answering the sixth paragraph, set forth on page four, of the printed bill of complaint, the defendant admits, in so far as it is material, that the Connecticut River rises in the Connecticut Lakes of northern New Hampshire and flows southward between New Hampshire and Vermont and across Massachusetts and Connecticut into Long Island Sound; that it is the largest river in New England and that it is about 345 miles long; that it drains an area of approximately 11,345 square miles, of which approximately 2720 are within the Commonwealth of Massachusetts and approximately 1430 in the State of Connecticut; and that it falls about 1900 feet from its headwaters in the Connecticut Lakes to Long Island Sound. The defendant avers that although available statistics indicate that the mean annual precipitation in the Connecticut River Valley is about 40 inches ranging from about 45 inches at Hartford to about 35 inches in the upper portions, the inadequacy of records in the higher portions of the watershed which are generally snow-covered for a considerable period of the year, makes it probable that the rainfall in the upper portions of the area is greater than the statistics indicate. The defendant, if it be material, is ignorant as to whether the United States Government has found that the Connecticut River is a navigable stream from Springfield, Massachusetts, to Long Island Sound and leaves the petitioner to prove the fact if material, but the defendant admits that the por-

tion of said river below Hartford is to some extent in use as a means of transportation for passengers and freight. The defendant is ignorant as to whether a line of steamships carrying passengers between Hartford and New York makes two trips daily on said river, or as to whether the citizens of Connecticut and the industries throughout the Connecticut Valley and elsewhere receive coal, merchandise, and other freight by means of the Connecticut River, or as to whether there is a large number of sloops, yachts, and pleasure craft maintained and used upon said river; and the defendant leaves the complainant to prove all or any of these facts in so far as the same may be material. Each and every other material allegation of fact, if any such there be, contained in the sixth paragraph of the bill of complaint is denied by the defendant.

7. Answering paragraph 7 set forth on pages four and five of the printed bill of complaint, the defendant denies each and every material allegation of fact contained in said paragraph, except that it admits that the Ware River rises in the town of Westminster in Worcester County, flows southwesterly ten miles to New Boston, where it turns and flows northwesterly to Barre Falls, from which place it flows in a general southwesterly course to a point where it receives the Swift River, approximately seven-tenths of a mile northerly of the village of Three Rivers in the town of Palmer, and that the joint rivers then flow about seven-tenths of a mile to the said village of Three Rivers, where the joint rivers receive the Quaboag, which confluence forms the Chicopee River which flows in a direction approximately south of west to the city of Chicopee, where the Chicopee River enters the Connecticut River. The defendant admits further that the total distance from the source of the Ware River to the mouth of the Chicopee River is approximately sixty miles. The defendant avers that the

total drainage area of the Ware River, from its source to its confluence with the Swift River, is about two hundred and nineteen square miles, that the total drainage area of the Ware River above the point at which the diversion of certain flood waters is authorized by certain legislation of the Great and General Court of the Commonwealth of Massachusetts hereinafter mentioned and attached hereunto marked exhibit A, is only 98 square miles, and that even from this area only the diversion of certain flood waters as defined in the said legislation is authorized.

8. Answering the eighth paragraph, set forth on page five of the printed bill of complaint, the defendant admits the material allegations of fact contained in said paragraph.

9. Answering the ninth paragraph, set forth on page five of the printed bill of complaint, the defendant admits the material allegations of fact contained in said paragraph.

10. Answering the tenth paragraph, set forth on page five of the printed bill of complaint, the defendant denies that all the country drained by the Ware, Quaboag, Swift and Chicopee rivers is hilly, but admits that a large portion of such country drained by the said tributaries of the Connecticut River is hilly. The defendant admits that the average slope of the said various tributaries is about fifteen feet to the mile. The defendant admits that many lakes and ponds drain into the Connecticut River through small tributaries and that the minimum flow of said river is well sustained by natural drainage and filtrations. Each and every other material allegation of fact, if any such there be, contained in the tenth paragraph of the bill of complaint is denied by the defendant; and further answering, the defendant says that by the Constitution of the United States jurisdiction to determine questions affecting navigability of navigable waters is committed to Congress and to such officials as Congress may designate, and that Congress has so designated the

officials of the War Department and has delegated the administration of its powers of supervision of navigable streams to said officials and that the determination of Congress or said officials of the War Department is conclusive as to whether or not the navigability of a navigable stream is affected adversely by any act complained of by the bill of complaint.

11. Answering the eleventh paragraph, set forth on page six of the printed bill of complaint, the defendant says that it is ignorant as to whether the State of Connecticut is the owner of the bed of the Connecticut River within the territorial limits of the State of Connecticut and leaves the complainant to prove the same in so far as it be material; [* and further answering the defendant avers that in view of the determination of the Secretary of War, upon recommendation of the Chief of Engineers, that within the limits stated in the annexed findings of the department the proposed diversion of certain of the flood waters of the Ware river and of certain waters of the Swift river contemplated by the said defendant, the Commonwealth of Massachusetts, will have no adverse or injurious effect upon the navigability of the Connecticut river, and in view of the findings of the Chief of Engineers, approved by the Secretary of War, set forth in Appendices "B" and "C", attached hereunto and made a part hereof, no question of whether or not any act done or contemplated to be done by the Commonwealth of Massachusetts has or will have an adverse or injurious effect upon the navigability of the Connecticut river is here relevant or material, in the absence of proof that the Commonwealth of Massachusetts has diverted or actually proposes to divert more water than it is permitted to divert by the terms of the orders of the War Department, inasmuch as the determination of such issues and the protection of the capacity of navigable streams in the interest of interstate and

* Text in brackets inserted by amendment, allowed December 2, 1929.

foreign commerce has been committed by the Constitution of the United States to the Congress, which has delegated the greater part of its administrative powers in that behalf to the War Department, to the Secretary of War, and to the Chief of Engineers. The defendant, however, avers that neither the diversions authorized by the Massachusetts legislation, annexed hereunto and made a part hereof and marked "Appendix A", nor the said diversions as modified in accordance with the terms of the permission contained in the War Department's orders, annexed hereunto and made a part hereof and marked "Appendix B" and "Appendix C", will in any way unreasonably alter or modify the navigable capacity of the navigable portion of the Connecticut river; nor will the said diversions either as authorized by the Massachusetts legislation or as modified by the War Department's orders aforesaid cause any damage whatsoever to the health, welfare, safety, or property of the State of Connecticut or the citizens thereof]. Each and every other material allegation of fact, if any such there be, contained in the eleventh paragraph of the bill of complaint is denied by the defendant.

12. Answering the twelfth paragraph set forth on page six of the printed bill of complaint the defendant is ignorant as to whether the State of Connecticut is the owner of a certain tract of land situated on the banks of the Connecticut River in the city of Middletown within said State, and is further ignorant as to whether there is a state hospital for the insane located upon said tract, and leaves the complainant to prove the same in so far as it be material. Each and every other material allegation of fact contained in said twelfth paragraph of the bill of complaint is hereby denied by the defendant.

13. Answering the thirteenth paragraph, set forth on pages six and seven of the printed bill of complaint, the defendant admits the duties of the State of Connecticut as *parens patriae*, but denies each and every other mate-

rial allegation of fact contained in said paragraph; and further answering, says that no property or person situated or living in or having interest in the Connecticut Valley, so-called, is in any way injuriously affected by any acts and things done, contemplated to be done, or threatened to be done, by the Commonwealth of Massachusetts.

14. Answering the fourteenth paragraph, set forth on page seven of the printed bill, the defendant admits that the Connecticut River flows through a portion of the State of Connecticut, said portion of said State being commonly designated as a part of the Connecticut Valley, from Longmeadow near and south of Springfield, Massachusetts, to Saybrook, Connecticut, where it empties into Long Island Sound, which is an arm of the Atlantic Ocean. But the defendant denies that there is a vast area of watershed on either side of said river which has received any benefit from the flood waters of said river, but on the contrary the defendant says that said flood waters are in nowise of benefit to said watershed but cause great and immeasurable damage to the lands, which are at times covered by said waters. The defendant further denies each and every other material allegation of fact contained in said fourteenth paragraph of the bill of complaint. And further answering, the defendant says that no act or thing done or contemplated to be done by the Commonwealth of Massachusetts will in any way materially affect the flow of the Connecticut River or have any tendency to affect adversely the fertility of any land within the territorial boundaries of the State of Connecticut, but on the contrary the defendant alleges that all acts done or contemplated to be done by the Commonwealth of Massachusetts will benefit the State of Connecticut in that they will afford a means by which the damages from excessive and unusual floods may be in part controlled and reduced by withholding the said flood waters from an area which

otherwise would be covered with water and damaged. And the defendant further alleges affirmatively that according to certain plans for the storage, by the Commonwealth of Massachusetts of water in the valley of the Swift River, it will be possible, and it is the intention of Massachusetts to release a sufficient amount of water daily to maintain a reasonable flow in the Swift River and thus contribute to the maintenance of the flow of the Connecticut River itself. And further answering, the defendant says that under the legislation adopted by the Commonwealth of Massachusetts, so much of the waters of the Swift River as may be held back with the permission of the War Department of the United States will be stored by the Commonwealth of Massachusetts in the valley of the Swift River and will be in nowise diverted into any other place until such time as the said waters are actually required for use for drinking and other household purposes by the citizens and inhabitants of the Commonwealth of Massachusetts, at which time the waters will be transferred, as actually needed for such use, to reservoirs directly supplying the region in and about the city of Boston; that only the flood waters of the Ware River, as defined in said legislation, copies of which are hereunto annexed marked Appendix A, will be diverted by the Commonwealth of Massachusetts under the provisions of said legislation, so that no interference with, or diminution of, the flow of said last-named river during the drier seasons of the year will take place, such flood waters actually taken being in part stored in the Wachusett Reservoir and in part in a reservoir to be constructed in the valley of the Swift River, to which reservoirs such flood waters of the Ware River actually diverted will be transferred by means of tunnels and conduits, and that such flood waters will be so diverted only for a supply of water for drinking, household, and other domestic and municipal uses of the 1,900,000

human beings living in the city of Boston and its environs.

15. Answering the fifteenth paragraph, set forth on pages seven and eight, of the printed bill of complaint, the defendant says that it is ignorant of the truth or accuracy of the material allegations of fact therein set forth and therefore leaves the complainant to prove the same in so far as they may be material, but the defendant denies the truth or the soundness of the conclusions reached in said paragraph as to the benefit to riparian lands resulting from the flooding thereof and the depositing of sediment thereon, as alleged in said paragraph.

16. Answering the sixteenth paragraph, set forth on page eight, of the printed bill of complaint, the defendant admits that the State of Connecticut is in part thickly populated, but avers that said State is also in part a rural community and sparsely settled; and the defendant further admits that the inhabitants of said State have large agricultural and industrial enterprises and interests in that area known as the Connecticut Valley; that the Connecticut Valley is drained by the Connecticut River; that beyond the borders of the State of Connecticut and for many miles within the territorial limits of the Commonwealth of Massachusetts there is a large watershed which is drained by the said Connecticut River; and that to some extent, both within Massachusetts and Connecticut, cities, towns, factories, and riparian owners discharge sewage, offal, and waste matter, but no offal in Massachusetts, in such manner that it is emptied into and carried away and disposed of by the waters of the Connecticut River, but to what extent such drainage takes place the defendant is ignorant and leaves the complainant to prove the same in so far as it be material. And the defendant denies that such acts and things pertaining to drainage have been done necessarily by reason of the natural topography of the country, or that it is

necessary because of such drainage that the natural flow of the Connecticut River or the flood waters thereof should remain undiminished and unimpeded, or that it is necessary, in the present state of development of scientific or hygienic disposition of such sewage, that such sewage, offal, and waste material should continue to be emptied into the waters of said river, either in Connecticut or at any other point. And further, the defendant denies that considering the present uses of the Connecticut River and of the valley adjacent thereto, either by inhabitants of the Commonwealth of Massachusetts or municipalities therein or by inhabitants of the State of Connecticut, any interference with the flow of the Connecticut River or diminution in the volume of water discharged by it or carried by it, and still less such acts and the execution of such plans as are authorized by the legislation of Massachusetts to provide a domestic supply of water as hereinbefore and hereinafter set forth, will in any way adversely affect the health of the citizens of the State of Connecticut or cause to them any sickness, suffering or discomfort, or in any way cause or make possible disease and epidemics, or that there will be in any way damage caused to the State of Connecticut or to the citizens thereof. The defendant avers that the waters of the Connecticut River at the point where the river crosses the boundary between the State of Connecticut and the Commonwealth of Massachusetts could successfully dilute and carry away several times the volume of sewage now contained in the said waters at that point without in any degree or manner causing sickness, suffering, epidemic, or even discomfort to the State of Connecticut or to the people thereof, and further, the defendant avers that the diversions of some of the waters of the Swift River and of the flood waters of the Ware River planned and contemplated by the defendant and described in its said legislation will in nowise cause

an appreciable diminution in the flow of the Connecticut River at the state boundary, or indeed a diminution which it would be possible to determine by usual methods of stream flow measurement at that point. And further, the defendant affirms that there is an adequate remedy at law for acts or injuries, if any such there may be, incidentally caused to the State of Connecticut or to the citizens thereof; but the defendant denies that there will be any wrongful acts or injuries to the State of Connecticut or to citizens thereof done or caused to be done by the Commonwealth of Massachusetts or by its inhabitants, as in the bill of complaint alleged and set forth. And further answering, the defendant says that all acts referred to in the bill of complaint done or contemplated to be done by the Commonwealth of Massachusetts will, as herein set forth both above and hereafter, benefit the State of Connecticut and the citizens thereof, and that said acts and things done or contemplated to be done are in law and in fact in all respects a reasonable and proper use by the Commonwealth of Massachusetts of the waters of the Swift and Ware rivers in no way inconsistent with any rights, interests, privileges, or immunities of the State of Connecticut or of the citizens thereof.

17. Answering the seventeenth paragraph, set forth on pages nine and ten, of the printed bill of complaint, the defendant admits that it, the Commonwealth of Massachusetts, has already expended certain sums of money in making plans, preparing specifications, advertising for bids from contractors, and doing certain further acts and things incident to carrying out certain plans to store and to divert, for a domestic water supply for the inhabitants of Boston and its environs, certain waters of the Swift River and of the Ware River, in accordance with the provisions of Massachusetts Acts of 1926, chapter 375, and Acts of 1927, chapter 321, which are

annexed to this answer, marked "Appendix A", and made a part hereof, and further answering the defendant avers that said rivers are wholly within the territorial limits of the Commonwealth of Massachusetts. Each and every other material allegation of fact contained in said seventeenth paragraph of the bill of complaint the defendant denies.

And further answering, the defendant says that within the city of Boston in said Commonwealth and within the area immediately about said city there is a rapidly growing population, now containing approximately 1,900,000 persons; that for a long period of time it has been apparent that the present supply of water for drinking and domestic purposes is inadequate and if not supplemented by further supplies of pure water for drinking and domestic purposes the persons residing in the Metropolitan district about the city of Boston and within said city will be unable to continue a normal growth in that region and will be subjected to discomfort, inconvenience, and grave risk and danger from sickness and epidemic; that the taking of certain of the waters of the Ware River and of the Swift River has for more than thirty years been definitely contemplated by the Commonwealth of Massachusetts for the purpose of supplying the Metropolitan area about Boston with water for drinking and other domestic uses; that a study of the water requirements of the city of Boston has gone on for over a century, and that experts in water and sanitary engineering have made frequent and well-considered reports of the situation and problem in this respect; that the overwhelming majority opinion of qualified persons who have studied the situation has determined that no other satisfactory and adequate source of a supply of water exists for said city of Boston and the Metropolitan area about said city unless it includes the waters of the Ware and the Swift rivers, and that no other supply can possibly meet the

reasonable demands and needs of the said area and of its rapidly increasing population; that the population whose needs require the proposed diversions from the Ware and Swift rivers is not only that of the metropolitan area within ten miles of the State House, but also that of several other centers whose future requirements must be met directly from metropolitan sources or from sources close to the metropolitan area which would otherwise be available to the metropolitan district itself, that the total population supplied by the district or whose water supply needs are thus intimately connected with those of the district, is over two and one-half million and rapidly growing, comprising nearly 1,900,000 in the metropolitan area itself, 300,000 in the Merrimac Valley group which have long been demanding water from the Wachusett Reservoir, 275,000 in metropolitan Worcester whose needs are met by areas allotted from the Wachusett drainage area, and 100,000 in Essex County, whose need of the Ipswich River prevents its use by the metropolitan district; that in accordance with the reports of competent authorities the Great and General Court of Massachusetts, by its enactment of Acts of 1926, chapter 375, and Acts of 1927, chapter 321, above referred to and annexed to this answer, has provided for taking the flood waters of the Ware River, as described in said acts, and certain of the waters of the Swift River, as a source of supply of water for domestic purposes for the city of Boston and other communities in and adjoining the Metropolitan area. The defendant avers that the Commonwealth of Massachusetts, in accordance with the provisions of the said acts of the Great and General Court of the Commonwealth, proposes to divert the flood waters of the Ware River, as defined in said acts, and to store them either in the Wachusett reservoir near the city of Worcester in said Commonwealth or in the reservoir to be constructed in the Swift River Valley in

accordance with the provisions of said acts, by the Commonwealth of Massachusetts; that the Ware River will be connected with both the Swift River Reservoir and the Wachusett Reservoir by a system of tunnels, conduits, and aqueducts so that water may be transferred into one reservoir or another as need may require; that the Wachusett Reservoir now directly supplies the city of Boston and the Metropolitan area about said city; that the said Commonwealth proposes to construct, by building certain dams in the valley of the Swift River, a reservoir, which will cover with water a large area in the valley of the Swift River; that in this reservoir it is proposed to store not only large quantities of water of the Swift River in excess of a certain minimum flow, as described in the legislation above referred to, but also certain flood waters of the Ware River, which will be transferred to the said Swift River Reservoir by the said system of tunnels and aqueducts above referred to; that the scope and nature of the works authorized by the said legislation is shown upon a blueprint map of the so-called New England states attached hereunto, to which reference is made hereby, upon which map is shown the small area drained by the Ware River and the Swift River above the points at which the flood waters of the Ware River and certain waters of the Swift River are respectively diverted, and also the large area comprised in the whole watershed of the Connecticut River and the defendant avers that it is clearly and graphically shown by the said map how small, minute, and reasonable with respect to the whole waterflow of the Connecticut River watershed are the watersheds from which a partial diversion is authorized; that in the judgment of the Great and General Court of said Commonwealth the emergency is so great and the prospect of a failure of a domestic water supply for the Metropolitan district is so imminent as to lead it to provide in said legislation, in order to

make possible the location and construction of said reservoir, for the elimination and termination of three historic towns of said Commonwealth, to wit, Enfield, Greenwich, and Prescott; that the Commonwealth has no plan or intention of diverting from the Connecticut River watershed the waters of any other river than the Swift River and the Ware River, and that the acts of the Great and General Court of Massachusetts, set forth in Appendix A hereof, specifically prohibit the diversion or use of any of the waters of the Miller's River; that the proposed diversion of certain of the waters of the Swift River and of the flood waters of the Ware River will in nowise materially affect the flow of the Connecticut River, and that it will be impossible to determine by any practicable measurements at the point where the Connecticut River passes the boundary between the State of Connecticut and the Commonwealth of Massachusetts any diminution in the flow of said river caused by the proposed diversion and storage of the waters of the Ware River and of the Swift River; that in nowise will the State of Connecticut or the inhabitants thereof be injured or damaged, or will their health or safety be imperilled, or will any discomfort be caused to the inhabitants of the State of Connecticut by reason of the said diversion. And the defendant further avers that by the storage of water contemplated the Commonwealth of Massachusetts will reduce somewhat the intensity and severity of certain seasonal floods which take place in the Connecticut Valley and watershed to the great damage of the inhabitants thereof, both within the State of Connecticut and within the Commonwealth of Massachusetts; that all the waters so taken or planned to be taken in order to supply the inhabitants of the city of Boston and of the Metropolitan area about said city with a necessary, adequate, and satisfactory supply of water for drinking and domestic purposes fall within the territorial limits of

the Commonwealth of Massachusetts and are subject to be taken by the said Commonwealth and by the laws thereof and according to the laws in force throughout the United States of America, subject only to the right of the Federal Government to control and regulate navigable waters; that the said taking of waters will in nowise contravene any Federal law or right, nor, if it be here material, which the defendant denies, will said taking in any way impair or impede the navigability of any portion of the Connecticut River; that such uses for drinking and domestic purposes of the waters so to be stored and diverted both in law and in fact constitute a reasonable and proper user of the waters of the Swift and of the Ware rivers, and they are in nowise inconsistent with any rights, interests, privileges, or immunities of the State of Connecticut or of the inhabitants thereof. And further answering the defendant says that by the laws of the State of Connecticut the diversion of water from the watershed of the Connecticut and other rivers is permitted and authorized for the purpose of providing municipal supplies of water for domestic use; and the defendant avers that the law both of the Commonwealth of Massachusetts and of the State of Connecticut permits the reasonable use of water by riparian owners if such use does not unreasonably injure lower riparian owners; that the laws of both said State and Commonwealth permit the diversion of waters, even of interstate streams, for the purpose of providing a water supply for the domestic use of the inhabitants of the community, and permit the diversion of said waters to a watershed beyond the watershed of said stream.

18. Answering the eighteenth paragraph, set forth on page 10, of the printed bill of complaint, the defendant denies that it, the Commonwealth of Massachusetts, has made extensive surveys, perfected elaborate plans, and proceeded to carry such plans into execution with-

out notice to the State of Connecticut or without any attempt to ascertain whether damage would result, from such diversion of water as is contemplated, to the State of Connecticut or to property owned by the State of Connecticut, or to citizens of the State of Connecticut, or to the interest and welfare of the State of Connecticut; but on the contrary the defendant avers and alleges that the State of Connecticut was fully and completely aware of the plans of the Commonwealth of Massachusetts; that the State of Connecticut was officially represented at hearings before legislative committees of the Great and General Court of the Commonwealth of Massachusetts when the acts authorizing the carrying out of the plans complained of were being considered; that the plans now adopted by the Commonwealth of Massachusetts are the result of a comprehensive study of the water supply problem of the metropolitan district of Boston and that the said study of the problem has been going on for more than a century without in any manner being kept secret; that the recommendations and reports of engineers, water and health experts and other technical students of the situation have been printed and circulated as public documents and have with practical unanimity favored the use of the waters of the Swift River and the Ware River for the purpose of said water supply, and that such waters constitute the only suitable and adequate supply available for the reasonable needs of the metropolitan district of Boston for water for domestic purposes, and that said reports of experts studying the problem have been made public and have been available to officials of the State of Connecticut.

And further answering, the defendant denies that the taking of certain waters from the Swift River and the flood waters of the Ware River, contemplated by the Commonwealth of Massachusetts, is part of such a gen-

eral plan as is set forth in the eighteenth paragraph of said bill of complaint or of any plan other than that specifically set out in said legislation a copy of which is hereunto annexed as Appendix A. Each and every other material allegation of fact, if any such there be, contained in said eighteenth paragraph of the bill of complaint is denied by the defendant.

And further answering, the defendant says that any user of said waters done or contemplated to be done constitutes a reasonable user of said waters by the Commonwealth of Massachusetts in no way inconsistent with any right or interest of the State of Connecticut or of the inhabitants thereof.

19. Answering the nineteenth paragraph, set forth on pages 10 and 11, of the printed bill of complaint, the defendant denies that it, the Commonwealth of Massachusetts, has various other plans in addition to the diversion of any waters now contemplated to be taken as authorized by the said legislation or has under construction conduits, reservoirs, and tunnels for the diversion and storage of waters from tributaries of the Connecticut river other than its plans for diversion of certain waters of the Swift River and some of the waters of the Ware River, or that any diversion of waters of rivers other than the Swift and the Ware rivers has been authorized by the Commonwealth of Massachusetts. Each and every other material allegation of fact, if any such there be, contained in the said nineteenth paragraph, is hereby denied, but the defendant avers that said Connecticut River could successfully dilute and carry away several times the volume of sewage contained in said river at the point where it crosses the boundary between the State of Connecticut and the Commonwealth of Massachusetts without in any degree causing a menace or danger to the health of the inhabitants of the State of Connecticut or causing to said inhabitants any discomfort.

20. Answering the twentieth paragraph, set forth on page 11, of the printed bill of complaint, the defendant, the Commonwealth of Massachusetts, admits that it has already let certain contracts and done certain preliminary work on the construction necessary for the diversion of the flood waters of the Ware River and of such waters of the Swift River as the said Commonwealth proposes to store and divert. The defendant further admits that unless enjoined from so doing it intends to proceed with the work authorized by the Great and General Court of Massachusetts in Acts of 1926, chapter 375, and Acts of 1927, chapter 321; that it is proposing to proceed with such work because of the pressing emergency confronting the Commonwealth with respect to providing a suitable, necessary, and adequate supply of water for drinking and domestic purposes for the city of Boston and for the metropolitan district about said city; that unless a supply is furnished within a very short period the inhabitants of the said area in and about the city of Boston will be subjected to grave and serious dangers of epidemic and disease, and that the inhabitants of the said area will have insufficient water to meet their necessary and reasonable requirements for drinking purposes; that the construction of the work proposed for the diversion described herein and authorized by the said acts will take a considerable number of years, and that the first works for the diversion of the flood waters of the Ware River cannot, according to the best information at the disposal of the defendant, in any event be completed before 1931, and that until that time no diversion of water from the Connecticut River watershed will be effected by the said works; that by the said diversion, as has been alleged and averred above, only the flood waters of the Ware River, as described in said act, and certain of the waters of the Swift River will be diverted, in no way causing any appreciable diminution

in the flow of the Connecticut River at the point where the said Connecticut River enters the State of Connecticut. Each and every other material allegation of fact, if any such there be, contained in said twentieth paragraph of the bill of complaint is denied by the defendant.

21. Answering the twenty-first paragraph, set forth on page 11 of the printed bill of complaint, the defendant, the Commonwealth of Massachusetts, denies each and every material allegation of fact contained in said paragraph. And further answering, the defendant says that any diversion of the flood waters of the Ware River and of such waters of the Swift River as the said Commonwealth plans to divert is within the sovereign and riparian rights of said Commonwealth and authorized by the laws of said Commonwealth and by the laws of the United States of America, and that in nowise is the State of Connecticut, as *parens patriae* or in its own right, or are the citizens of the State of Connecticut, deprived of any of their rights or property, either contrary to law or without due process of law. And the defendant further alleges that by virtue of the provisions of the acts of the Great and General Court of the Commonwealth of Massachusetts, hereinbefore referred to, authorizing the said diversions, due and adequate provision is made for the payment of compensation, not only to citizens of the Commonwealth of Massachusetts but also to citizens of the State of Connecticut, who may suffer any damage by reason of the said diversion, whether such damage be suffered within the Commonwealth of Massachusetts or within the State of Connecticut; and the defendant further alleges that by the common law of the Commonwealth of Massachusetts, as set forth in the leading case of *Manville Co.* v. *City of Worcester*, reported in the 138th Massachusetts Reports, at page 89, a remedy is given not only to citizens of the Commonwealth of Massachusetts but to citizens of the

State of Connecticut for damages suffered within their borders by virtue of any diversion authorized by the said Commonwealth. And the defendant says that the said remedies in the courts of the Commonwealth of Massachusetts at common law and by virtue of the acts of the Great and General Court, above referred to, constitute a full, sufficient, and adequate remedy at law which may be prosecuted by the State of Connecticut or any inhabitants thereof.

22. Answering the twenty-second paragraph, set forth on page 12 of the printed bill of complaint, the defendant admits that heretofore within the territorial limits of said Commonwealth of Massachusetts certain cities and towns, acting with the consent of said Commonwealth, have constructed certain sewerage systems which in part empty and discharge into the Connecticut River, or tributaries thereof, and further, the defendant admits that certain waste material is discharged by a number of mills and industrial plants within the Commonwealth of Massachusetts into the Connecticut River or into tributaries thereof; but the defendant denies that any such permitted discharge of sewage or other matters by any agency, corporation, or person within the Commonwealth of Massachusetts cannot be carried away and removed unless the present normal flow of the river is maintained, or that the periodic discharge of flood waters is necessary to carry away such sewage and other substance or to cleanse and purify the Connecticut River and the banks and property adjacent thereto. And further answering, the defendant avers that the waters of the Connecticut River at the point where said river passes the boundary between the State of Connecticut and the Commonwealth of Massachusetts could successfully dilute and carry away several times the volume of sewage and other substances now contained in the said waters without in any way causing damage, injury, or discomfort to the inhabit-

ants of the State of Connecticut. Each and every other material allegation of fact, if any such there be, contained in said twenty-second paragraph of the bill of complaint is hereby denied by the defendant. And further answering, the defendant says that no diversion of water of any tributary of the Connecticut River authorized by said legislation of the Commonwealth of Massachusetts will in any way prevent the proper removal of sewage drained in said river or the purification of said river by the natural processes of the flow of said river.

23. Answering the twenty-third paragraph, set forth on page 12 of the printed bill of complaint, the defendant says that it is ignorant as to what interests the complainant represents and leaves the complainant to prove the same in so far as it is material. Each and every other material allegation of fact, if any such there be, contained in said twenty-third paragraph of the bill of complaint is denied by the defendant.

24. Answering the twenty-fourth paragraph, set out on page 13 of the printed bill of complaint, the defendant denies each and every material allegation of fact contained in said paragraph, particularly denying that the State of Connecticut has either by the law of the State of Connecticut or under the laws of the Commonwealth of Massachusetts, either as a sovereign, as *parens patriae*, or as a riparian owner, any vested right to the waters of the Connecticut River or to any portion thereof above and beyond a reasonable flow within said river. And the defendant further avers that the Commonwealth of Massachusetts by its law and consistently with the laws of the State of Connecticut is entitled as a sovereign and as *parens patriae* to make reasonable use of the waters of tributaries of the Connecticut River or of the Connecticut River itself within the borders of said Commonwealth, so long as it does not in any material and extraordinary way interfere with a reasonable flow within said

river. And the defendant says that it in no way interferes with the flow of said river or of its tributaries or contemplates any such interference or diversion of waters of the Connecticut River or of its tributaries as will in any way injure the State of Connecticut or its inhabitants or will in any way interfere with any rights which the State of Connecticut has under the Constitution of the United States or by virtue of its sovereign rights or by virtue of the laws of nations or of the laws of the State of Connecticut or of the Commonwealth of Massachusetts.

25. Answering the twenty-fifth paragraph, set forth on page 13 of the printed bill of complaint, the defendant denies that the complainant, the State of Connecticut, or its citizens and residents are in any way damaged by any acts done, alleged to be done, or contemplated to be done by the Commonwealth of Massachusetts or by its citizens and residents. And the defendant further denies that the State of Connecticut in any capacity is entitled to any relief in this Honorable Court or that it has set forth any state of facts entitling it to relief in equity by this Honorable Court. Each and every other material allegation of fact, if any such there be, contained in said twenty-fifth paragraph of the bill of complaint or in the prayers of the complainant for relief, numbered 1 through 5 and appearing on pages 13, 14, and 15 of said bill of complaint, is hereby denied by the defendant.

And further answering, the defendant says

First. That a grave and serious emergency exists, as has been above set forth, within said Commonwealth of Massachusetts in that unless a suitable supply of drinking water and of water for domestic purposes is obtained by the City of Boston and the metropolitan area about said city, the inhabitants of the said area must of necessity be unable to continue their normal growth and life with reasonable safety and comfort within said area,

and will be subjected to great risks and menace from disease and epidemic, because of the lack of a suitable supply of pure and unpolluted drinking water which can be obtained from no source within the Commonwealth except from the watershed of the Connecticut River as has been authorized in said legislation with respect to certain waters of the Swift River and the flood waters of the Ware River. That the said Commonwealth has expended large sums in preparation for diverting and storing certain reasonable amounts of the waters of the said Swift and Ware rivers, which diversion will in no way seriously, appreciably, or unreasonably diminish the normal flow of the said Connecticut River or cause damage to the citizens of Connecticut or to the State of Connecticut; that the State of Connecticut has well known for a long time that such reasonable diversion of the waters of the Swift and of the Ware rivers has been contemplated by the Commonwealth of Massachusetts and has failed to make seasonable representations of any damage to said State or to its inhabitants, permitting the Commonwealth of Massachusetts to proceed with its studies, investigations, and plans and to expend large sums for the furtherance of said plans, relying upon the fact that the State of Connecticut, having due notice of the said plans, made no substantial opposition to the legislation pending before the Great and General Court of the Commonwealth of Massachusetts in the form in which the said legislation was finally enacted.

Second. That both the State of Connecticut and its inhabitants have an adequate remedy at law for any damage caused to it or to them by reason of the proposed diversion of certain of the waters of the Swift River and of the flood waters of the Ware River; that the inhabitants of the State of Connecticut, both by virtue of the common law of the Commonwealth of

Massachusetts and by virtue of the acts authorizing the said diversions, may sue in the courts of the said Commonwealth for compensation for any damage which they may suffer within said State of Connecticut, and that the State of Connecticut itself may recover such damages as it may suffer by reason of the said diversion, either to its sovereign right or to any riparian rights which it may possess, by an action of law before this Honorable Court.

Third. That by reason of the great emergency existing in the Commonwealth of Massachusetts as above set forth, because of the great and immeasurable suffering which would be caused to the citizens of the Commonwealth of Massachusetts if the said diversion be not permitted, and in consideration of the fact that the State of Connecticut and the inhabitants thereof will suffer no material damage by reason of the said diversion, if indeed they suffer any damage, a court of equity should not grant to the complainant in the premises any specific or injunctive relief, since the complainant in its proprietary capacity as a riparian owner has an adequate remedy at law and in its capacity of *parens patriae* needs no such relief on behalf of or because of the situation of all or any of its inhabitants, all of whom are given by the legislation of the Commonwealth of Massachusetts and by the common law prevailing therein a full, adequate, and complete remedy at law for any damage or injury suffered by them.

Fourth. That under the well established law laid down by this Honorable Court in accordance with the provisions of the Constitution of the United States, the State of Connecticut may not in this court recover any damages in behalf of its individual citizens against the Commonwealth of Massachusetts, nor may it receive any equitable or specific relief other than that to which it is entitled by virtue of its duties as *parens patriae.*

Fifth. That the allegations contained in the bill of complaint in many and divers places, with respect to any interference which may be caused by the said diversion with the navigability of the Connecticut River are in nowise material, relevant, and pertinent to this bill, [* inasmuch as the duty of protecting the navigability of navigable waters of the United States and the regulation of obstructions and diminutions of the navigable capacity of such waters has been committed, consistently with the provisions of the Constitution of the United States, by the Congress of the United States in large part to the Secretary of War, the Chief of Engineers, and the War Department, and in view of the determinations and findings of the Chief of Engineers, with the approval of the Secretary of War, as hereinbefore set forth and as more fully set out in said findings in Appendices "B" and "C", hereunto annexed and made a part hereof, within the limits provided in said findings, the issue of the effect of the proposed diversions upon the navigability of the Connecticut river is not open in these proceedings, in the absence of proof that the Commonwealth of Massachusetts has diverted or actually proposes to divert more water than it is permitted to divert by the terms of the orders of the War Department. The defendant, however, avers that neither the diversions authorized by the Massachusetts legislation, annexed hereunto and made a part hereof and marked "Appendix A", nor the said diversions as modified in accordance with the terms of the permission contained in the War Department's orders, annexed hereunto and made a part hereof and marked "Appendix B" and "Appendix C", will in any way unreasonably alter or modify the navigable capacity of the navigable portion of the Connecticut river; nor will the said diversions either as authorized by the Massachusetts legisla-

* Text in brackets inserted by amendment, allowed December 2, 1929.

tion or as modified by the War Department's orders aforesaid cause any damage whatsoever to the health, welfare, safety, or property of the State of Connecticut or the citizens thereof.]

Sixth. That the complainant has not set forth facts in the bill of complaint sufficient to show any material injury either to the State of Connecticut or to interests of the inhabitants of the State of Connecticut which the complainant is bound to protect as *parens patriae*, and that therefore, by virtue of the long established rule of this Honorable Court that it will not grant specific, equitable, or injunctive relief against a sovereign state of the United States of America, except for grave cause shown and because of serious encroachments upon the sovereign rights of a sister state or upon rights which said sister state is bound to protect as *parens patriae*, exhibited and proved by credible proof supporting specific allegations, the said State of Connecticut is in this case entitled to no specific, equitable, or injunctive relief.

Seventh. That the State of Connecticut has well known for a long time of the plans of the Commonwealth of Massachusetts with respect to the said diversions hereinbefore described, and, after the said plans had progressed materially, brought this bill in equity to enjoin the action of the said Commonwealth, causing great expense and delay to the said Commonwealth.

Wherefore, the defendant prays that it may be compensated for the said expense and delay caused by the complainant, and that it may be allowed its costs of defending this bill of complaint, thus improvidently and unnecessarily brought by the said State of Connecticut.

Eighth. That by virtue of sovereign rights and by virtue of riparian rights according to the laws both of the State of Connecticut and of the Commonwealth of Massachusetts, the Commonwealth of Massachusetts and individual citizens thereof and persons owning land

therein are entitled to make reasonable use of the waters of the Connecticut River and of tributaries thereof, not only for purposes of providing adequate supplies of water for drinking and household purposes, but also to make reasonable use of the said waters for drainage and sewage purposes, and the defendant says that it, the said Commonwealth of Massachusetts and the individual citizens thereof now make and will make after the plans now in contemplation by the said Commonwealth are carried into effect, only a reasonable and proper use of the waters of the Connecticut River and its tributaries for any and all the purposes to which the said waters are now put or are planned to be put by the said Commonwealth and its inhabitants, in nowise interfering with any vested or riparian rights of the State of Connecticut or of any inhabitants thereof.

Wherefore, the defendant prays that the bill of complaint exhibited against it, the said Commonwealth of Massachusetts, by the State of Connecticut may be dismissed, and that said defendant may be allowed its costs and may be compensated in damages for the delay and expense caused to it by the State of Connecticut and its officers and agents.

THE COMMONWEALTH OF MASSACHUSETTS,

By

JOSEPH E. WARNER,
Attorney General
Of the Commonwealth of Massachusetts.

BENTLEY W. WARREN,
Special Assistant Attorney General.

GERALD J. CALLAHAN,
R. AMMI CUTTER,
Assistant Attorneys General.

APPENDIX A.

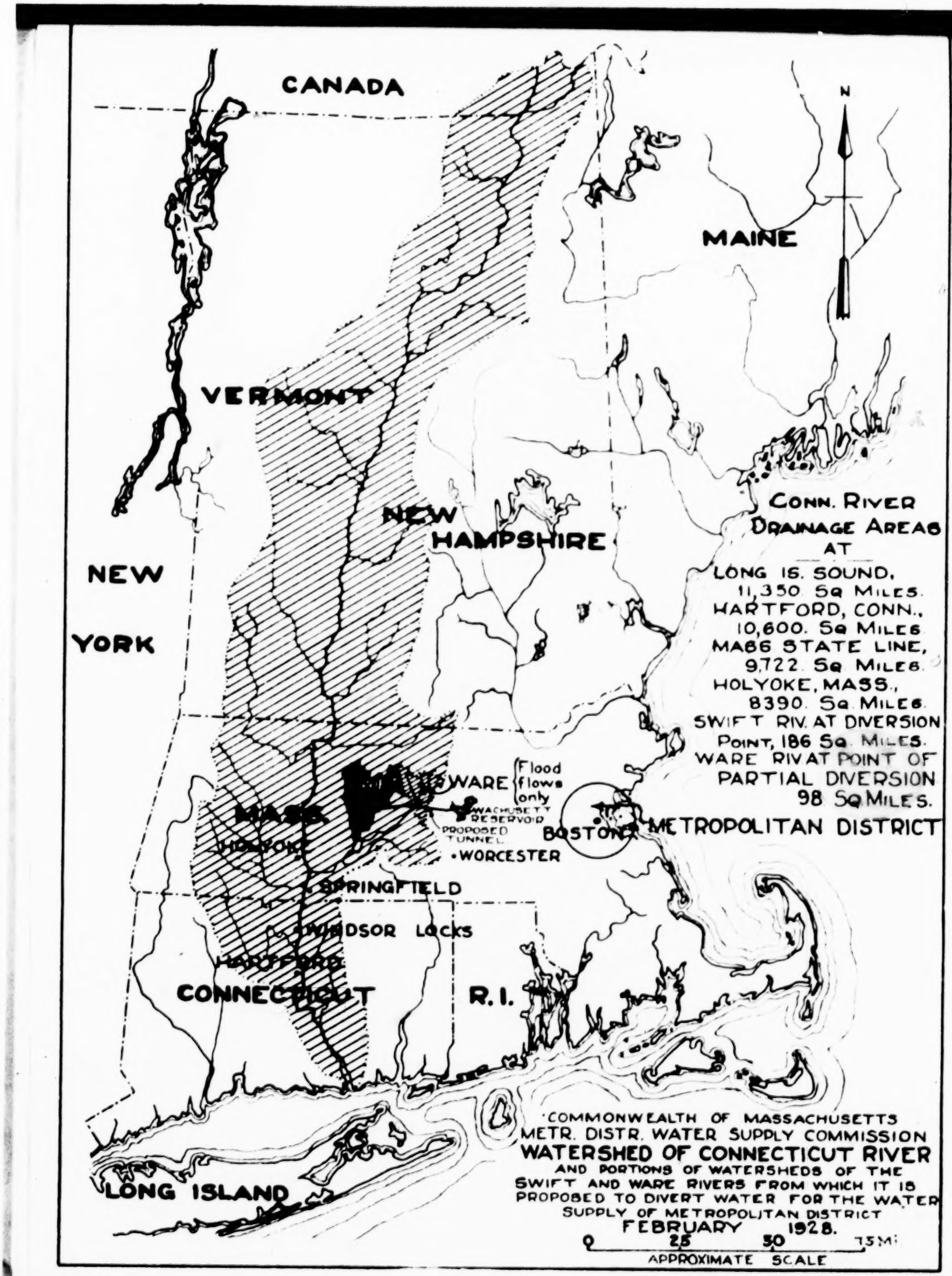
Acts of 1926, Chapter 375.

An Act making Additional Provision for the Water Supply Needs of the Metropolitan Water District and Other Communities which Now or Hereafter may require Water therefrom, and of the City of Worcester.

Whereas, The deferred operation of this act would, in part, defeat its purpose, therefore it is hereby declared to be an emergency law necessary for the immediate preservation of the public convenience;

Be it enacted, etc., as follows:

Section 1. A special metropolitan district water supply commission is hereby established, consisting of the commissioner of the metropolitan district commission as chairman and of two associate commissioners to be appointed by the governor with the advice and consent of the council, said commission to be hereinafter referred to as the commission. The associate commissioners shall serve for terms of five years, or until their successors are appointed and qualified. The governor may with like advice and consent remove any associate commissioner and fill for any unexpired term vacancies which may occur in the associate commissionerships. The chairman shall receive in addition to his salary as commissioner of the metropolitan district commission the sum of twenty-five hundred dollars a year, and the associate commissioners shall each receive a salary of four thousand dollars a year. The commission may hire such offices and other quarters as may be needed for the conduct of its work. The commission may appoint a chief engineer, and with the advice



FILE 1.0 P ACC. 794

and consent of the governor and council may fix his salary.

The commission, on behalf of the commonwealth, shall forthwith for the purpose of extending and increasing the water supply of the metropolitan water system, and of such cities and towns not members of the metropolitan water district as may hereafter require water from said system, divert into the Wachusett reservoir of said district the flood waters, as defined in section four, of the Ware river at a point in the town of Oakham or the town of Barre not more than one mile from the bridge of the Boston and Albany railroad crossing said river in the village of Coldbrook, and construct as a part of the metropolitan water system, such works as may be necessary for such extension and increase, and all structures and appurtenances incidental or complementary thereto; provided, that said flood waters shall not be so diverted between May thirty-first and December first in any year unless such diversion be first approved by the state department of public health. Said works, and particularly the aqueduct or tunnel required for said diversion, shall be constructed at such grade and of such capacity and otherwise so that they can be used as a part of works that shall later be constructed for diverting into the Wachusett reservoir the waters of the Swift river, in substantial accordance with the plans and recommendations of the joint board on water supply needs and resources of the commonwealth as contained in its report to the general court in the year nineteen hundred and twenty-two, printed as house document number fifteen hundred and fifty of said year. All plans, maps and records of said joint board relating to the proposed extension to the Ware, Swift and Millers rivers shall be made available to the commission, and the department of public health shall, at the expense of the commission, furnish it, on request, with any information relative to

said projects that said department may have in its possession. In constructing the works herein authorized, the commission may adopt such emergency methods as in its opinion may be necessary or desirable to secure their completion as soon as the public necessity may require.

Said aqueduct or tunnel upon completion to said point of diversion and the diverting dam and other works and property incidental thereto, when completed shall be turned over to the metropolitan district commission, and shall be thereafter maintained by said commission as a part of the metropolitan water system under chapter ninety-two of the General Laws with all the powers and duties conferred by said chapter.

The commission established hereby shall annually, on or before January fifteenth, make a report, in conformity with the provisions of section thirty-two of chapter thirty of the General Laws, for the fiscal year ending on the thirtieth of November preceding, and said report shall be printed as a public document under section six of chapter five of the General Laws.

SECTION 2. In contracts entered into by the commission for the construction of the works herein authorized, there may be inserted a provision that the commission or any contractor or sub-contractor for the commission may employ laborers, workmen and mechanics for more than eight hours in any one day and for more than forty-eight hours in any one week in such construction, when, in the opinion of the commissioner of labor and industries, public necessity so requires. The commission may appoint and in its discretion remove such engineering, legal, clerical and other assistants as it may deem necessary to carry on the work herein authorized, and may fix their compensation in accordance with such rules and regulations as the commission may establish and as shall be approved by the governor and council. Such appoint-

ments shall not be subject to classification under sections forty-five to fifty, inclusive, of chapter thirty of the General Laws, and chapter thirty-one of the General Laws shall not apply to removals, and, in accordance with such regulations as the commission may establish and as shall be approved by the governor and council, any appointment, including that of the chief engineer, may be wholly exempt from said chapter thirty-one. Upon request of the commission, the division of civil service shall hold special examinations.

SECTION 3. For the purpose of providing for the future extension of the metropolitan water system, the commission, on behalf of the commonwealth, may take by purchase or otherwise such lands, water rights, easements and other property in the watershed of the Swift river as it may deem necessary or desirable in preparation for the development of this river as a potential water supply for future use. The commission shall submit to the general court not later than the first Wednesday of January, nineteen hundred and twenty-seven, a draft of such legislation as it may deem necessary or advisable for the development of an adequate future water supply from the Swift river.

The commission shall also consider the recommendations of the metropolitan district commission relative to making available by filtration or chlorination, or both, the waters of the Sudbury and Cochituate watersheds as contained in house document number eleven hundred and ten of nineteen hundred and twenty-six and as referred to in the report of the metropolitan water supply investigating commission in house document number nine hundred of nineteen hundred and twenty-six; shall consider the effect on the present water supply of the metropolitan district of the addition thereto of water purified by filtration or other means and the effect of such water upon the present aqueducts, reser-

voirs and other facilities of the metropolitan water district; and shall report in detail plans and specifications for such land takings and for the construction of such additional works in the town of Framingham, and of such covered reservoirs as it may recommend, and the estimated expense thereof. The commission shall also consider and report on the amount of water which should be required for reasons of health and sanitation to flow below dam number one on the Sudbury river notwithstanding any provision of chapter one hundred and seventy-seven of the acts of eighteen hundred and seventy-two, and on all matters set forth in house document number ten hundred and forty-eight of nineteen hundred and twenty-six and the petition accompanying the same, especially the present and future water supply needs and resources of the town of Framingham, and the terms and conditions upon which said town should be entitled to receive water from the water supply now owned by the metropolitan district. The commission shall also consider and report upon the effect of the diversion for water supply purposes of the waters of the South Sudbury river upon public health in the town of Ashland, and whether or not a system of sewage disposal should be provided in said town in the event of such diversion. The commission shall report to the general court its findings and recommendations relative to the questions outlined in this paragraph, together with drafts of such legislation as may be necessary to effect its recommendations, by filing the same with the clerk of the house of representatives not later than December first of the current year, and it shall at the same time file a copy thereof with the budget commissioner.

SECTION 4. For the purposes of this act, the flood waters of the said Ware river which the commission is authorized to divert as provided in section one are hereby defined to be the waters thereof at and above

the point of diversion established under section one in excess of a flow of eighty-five million gallons a day, meaning thereby that on any day when the natural flow of said river is less than eighty-five million gallons no water shall be diverted.

The commission shall establish and maintain proper gauging stations or such suitable regulating devices as may be convenient and practical to establish the aforesaid limit of diversion with reasonable accuracy. Copies of all records obtained at such stations or by such devices shall be open to inspection during reasonable office hours and information shall be furnished, from time to time whenever reasonably requested, to any person owning or operating any mill or manufacturing establishment below the point of diversion or taking, or to the mayor of any city or the chairman of the board of selectmen of any town bordering on said river.

The waters of said Ware river and its tributaries at or above the point of diversion established as aforesaid, other than those authorized to be taken by the provisions of this act, and other than those waters not so taken which are needed for the processes of industry or for reasons of public health, are within its contemplation to be, when and as hereafter authorized by the general court, available for the domestic and public water supply of the city of Worcester and of the towns within the watershed of said river and its tributaries.

SECTION 5. For any of the purposes of this act, the commission, on behalf of the commonwealth, may at any time and from time to time take by eminent domain or acquire by purchase or otherwise the flood waters, as hereinbefore defined, of the Ware river and its tributaries, or any of said flood waters, at or above the point of diversion established under section one, and all water rights, water sources, lands, rights of way, easements and other interests in land, including any cemetery,

that may be deemed by the commission to be necessary or desirable for any of said purposes, or for the further protection of the purity of the waters to be diverted under this act.

Any taking under this act may be in fee or otherwise, perpetual in duration or for a limited period of time, according as the commission shall determine and set forth in the order of taking.

All takings under this act and all proceedings in relation to or growing out of the same shall conform to the provisions of chapter seventy-nine of the General Laws, except in the following particulars:

(*a*) The commission need make no award of damages sustained by persons or corporations in their property by any such taking.

(*b*) The notice required by section eight of said chapter may be given at any time within one year after the recording of the order of taking as provided in section three of said chapter.

(*c*) Petitions for the assessment of damages under section fourteen of said chapter may be filed within two years after the recording of the order of taking provided for in said section three, but petitions for the assessment of damages for the taking of rights of diversion may be filed within two years after, and not before, the actual diversion. The last six lines of section sixteen of said chapter seventy-nine, beginning with the word "but" in line three, shall have no application to takings under this act.

(*d*) For all property taken under this act, except rights of diversion, the right to damages shall vest upon the recording of the taking in the registry of deeds. For taking of rights of diversion the right to damages shall vest upon and not before the actual diversion of water.

The owner of any real estate, whether within or without the commonwealth, which is not taken but is injured

by the taking of the waters of Ware river under authority of this act or by the construction of the works incidental thereto shall be entitled to damages therefor and may recover the same from the commonwealth as in the case of a taking in accordance with the provisions of this act.

SECTION 6. In carrying out the powers and duties conferred upon it by this act, the commission may construct and maintain buildings, machinery, roads, conduits and aqueducts; may lay and maintain pipes, drains and wires; may alter or change the grades or directions of any water course; may carry and conduct any aqueduct, conduit, pipe, drain or wire under or over any water course, or any railroad, street or other way, in such a manner as not unnecessarily to obstruct or impede travel thereon; may dig up any such road, street or way, and lay, maintain and repair aqueducts, conduits, pipes, wires and other works beneath the surface thereof, conforming to any reasonable regulations made by the mayor and aldermen of cities and the selectmen of towns, respectively, wherein such works are performed, and restoring, so far as practicable, any such road, street or way, to as good order and condition as the same was in when such digging was commenced; the commission may enter upon and use the lands of others; may take down dams to such an extent as it may deem necessary for prosecuting its works, and shall rebuild such dams whenever the necessity for keeping them down ceases; shall use such lands and do all work relating to such dams, in a reasonable manner with regard to the interests of the owners thereof, and, so far as practicable, shall heed all reasonable requests made by such owners; and in general may do any other act or thing necessary or proper for carrying out the powers and duties conferred upon it by this act.

The commission may raise or alter or discontinue parts of any railroad or public way, and, in case of a

railroad, shall make such raisings or alterations of the railroad or construct upon existing or other locations parts of the railroad to take the place of the parts so discontinued, as and in such manner as shall be mutually agreed upon by the commission and the board of directors of the railroad company, and, if they cannot agree thereon, then as and in such manner as shall be determined on the application of either party in writing by the department of public utilities, which is hereby authorized and directed to adjudicate finally upon the same; and, if the commission shall be of the opinion that the making of any such change of grade, alteration or construction requires that lands or rights therein be taken therefor, the commission shall, on behalf of the commonwealth, take such lands or rights therein and convey the same to the railroad company, to be thereafter held and used as the board of directors of such company may determine, and the railroad company may, if it desires, locate its lines over any lands or rights therein so conveyed to it, and, when said new lines of railroad are completed, the railroad company may discontinue the operation of the portions of its existing lines for which the new lines are substituted, and may maintain and operate said new lines of railroad; and the commission shall make the raisings or alterations of public ways as aforesaid and build in place of the parts of public ways discontinued as aforesaid such other reasonable and suitable ways, which shall thereafter be highways, as and in such manner as shall be mutually agreed upon by the commission and the county commissioners of the county in which the work is done, or, if they cannot agree thereon, then as and in such manner as shall be determined on the application of the commission in writing by the division of highways of the department of public works, which division is hereby authorized and directed to adjudicate finally upon the same.

The commission, in flooding or otherwise affecting any burial ground, shall conform to any reasonable requirements relating thereto of the board of health of the city or town in which the same is located.

The commission may make such surveys, borings and do such other preliminary work on private lands as the commission may determine to be necessary or desirable, doing as little damage as possible and paying for the same.

SECTION 7. The commission may sell at public or private sale, or exchange or lease any property, real or personal, or any easement or water right, whether taken by eminent domain or otherwise acquired, which in the opinion of the commission is no longer needed for the purposes of this act. Any sums of money so received shall be applied to reduce construction costs or to reduce the bonded indebtedness for the works. The commission may, by lease, license or contract, permit the construction and maintenance on or over any land or waters under its control of towers, poles, wires and other structures for the purpose of transmitting electric power. The commission may construct, maintain and operate such power plants and other structures as may in its opinion be necessary to utilize the fall of water created at any of the dams, channels, tunnels or other structures under its control, for the production of power or electricity; may locate, construct and maintain lines for transmitting the same; and may sell or contract for the sale or use of any power or electricity so created, and any sums of money so received shall be applied to reduce the charges of maintenance of said works.

SECTION 8. For the purpose of carrying out the provisions of this act, the commission may expend such amounts, not exceeding in the aggregate fifteen million dollars, including the sum required to be paid by the city of Worcester under section twelve, as may, from

time to time, be approved by the governor and council. To meet such expenditures, the state treasurer shall, from time to time, on the request of the commission and subject to such approval, issue bonds of the commonwealth to an amount not exceeding the sum of fourteen million dollars, which shall be designated on their face, Metropolitan Additional Water Loan, Act of 1926. Such bonds shall be issued as coupon or registered bonds, for such term of years as may be recommended by the governor, in accordance with section three of Article LXII of the amendments to the constitution, and shall bear interest at such rate as shall be fixed by the state treasurer, with the approval of the governor and council. The amounts necessary to meet interest and serial payment requirements on said bonds and the expenses of maintaining and operating the works to be constructed by the commission under this act, and such other expenses as may be authorized hereunder, shall be added to the annual assessments upon the cities and towns comprising the metropolitan water district and apportioned and collected as provided by section twenty-six of chapter ninety-two of the General Laws.

Section 9. The supreme judicial court or any justice thereof and the superior court or any justice thereof, during a sitting of the court or in vacation, on the petition of the commission or of any city, town, corporation or person interested, or of the attorney of any such petitioner, shall have jurisdiction in equity or otherwise to enforce the provisions of this act and of any rule, regulation or order made under the authority of the same and to prevent any violation of said provisions, rules, regulations or orders; provided, however, that no suit in which the right of the commission to make any taking authorized by this act is questioned shall be brought except in the supreme judicial court for the county in which said taking has been made or is to be made, nor

unless the said suit is brought within six months after the passage of this act.

SECTION 10. No person shall after the effective date of this act erect a dam for mill purposes across the Ware river or any of its tributaries above the point of diversion authorized by this act without the consent in writing of the commission, or, after said works have been turned over to the metropolitan district commission, of said metropolitan district commission. In granting its consent, either commission may impose such conditions as it may deem to be for the public interest. Any person owning a practicable mill site on said river or any of its tributaries who applies for such consent and is refused, or is granted consent subject to conditions, and who is damaged in his property by such refusal or by the imposition of such conditions, may recover from the commonwealth the damage so caused in the manner provided in section five.

SECTION 11. The towns of Hubbardston, Barre, Oakham, Hardwick, New Braintree, Palmer and Ware, or any of them, may take from the Ware river above the point of diversion established under section one so much of the water thereof as they, or any of them, have already been, or may hereafter be, authorized by the legislature to take for supplying their inhabitants with water, and in case any of said towns shall hereafter on its application therefor be authorized to take such water it shall pay to the commonwealth, on behalf of the metropolitan district, a fair proportion of the cost incurred by the commonwealth for the acquisition under the provisions of this act of the waters of said river, or rights therein, and for the construction, maintenance and operation of such works and structures as are by this act provided for, including a fair proportion of the cost of maintaining the purity of said water, the said proportion to be determined by an engineer designated by the metropolitan

district commission and by an engineer appointed by such applicant town, and, if they cannot agree, such proportion shall be determined by a master to be appointed by the supreme judicial court on the petition of the commonwealth or said applicant town, and the report of the master when affirmed by said court shall be final and conclusive on all parties.

SECTION 12. The city of Worcester is hereby authorized, for the purpose of meeting the requirements of said city for increasing its water supply and such requirements of adjacent and nearby towns now supplied or hereafter required to be supplied by said city, from time to time, to acquire by purchase or otherwise, or take by eminent domain in accordance with the procedure set forth in section five, and subject to the provisions thereof, and to hold and convey, directly or indirectly, into and through said city the waters of South Wachusett brook, so-called, and the waters of Quinapoxet river, so-called, in the town of Holden, at or near an elevation of seven hundred and eight feet above mean sea level at Boston, at or above the outlet of Quinapoxet pond, including the waters in any ponds or reservoirs thereon and the waters flowing directly or indirectly, into and from the same, and all springs and tributaries thereto, and the water rights connected with the aforesaid waters and sources above the places of taking; and the said city may take existing reservoirs and ponds upon said streams and their tributaries above the points at which it is authorized as aforesaid to take the said waters, but the total supply herein authorized to be taken shall not exceed in any calendar year an average quantity of ten million gallons of water per diem, and the balance of the waters remaining, and also from time to time such part of the quantity of water herein authorized to be acquired and diverted as is not, in the opinion of the water commissioner of said city, needed for the supply of the water

system of said city, shall be permitted to flow to the Wachusett reservoir of the metropolitan water system; provided, that if in the opinion of the metropolitan district commission, the needs of the metropolitan water system, pending the completion of the works necessary to divert the flood waters of the Ware river as authorized in section one, require that said amount herein authorized to be taken by the said city be reduced, the metropolitan district commission may, at any time and from time to time, reduce said amount to not less than an average quantity of five million gallons of water per diem. In case of such reduction the commonwealth on behalf of the metropolitan district shall pay the city of Worcester for the amount of water so withheld by such reduction at the rate of forty dollars per million gallons. The said city shall take such measures to protect and preserve the purity of the said waters and shall maintain such sanitary conditions relative thereto and in their respective watersheds as the state department of public health may require. Said city may by aqueduct or pipe line conduct the waters so taken, into the city directly or through any reservoir and any aqueduct or pipe line belonging to said city and now existing. The said city may, for the purposes aforesaid, construct, lay and maintain conduits, pipes, canals, water courses, dams, reservoirs and other works under or over lands, water courses, railroads, railways, public or private ways and along such ways, and may take by purchase or otherwise and hold in fee or otherwise any lands, dams or structures, easements or rights in land that may be deemed necessary for said purposes and for collecting, purifying, storing, discharging, conducting or distributing said waters or preserving the purity thereof. The water taken by said city under this section shall be measured in a manner approved by the metropolitan district commission which shall have at all reasonable times free

access to any apparatus or device used for measuring the same and to the records thereof.

In addition to such payments and damages as said city may be required to make for any purchases or takings hereinbefore authorized, it shall pay into the state treasury on or before the first day of July, nineteen hundred and twenty-seven, the sum of one million dollars, and thereupon the metropolitan district commission, acting for the commonwealth, shall release and convey to said city all right and title to said waters, subject to the provisions of this act. The amount so paid into the state treasury shall be used toward defraying construction costs incurred by the commission under this act.

In consideration of the provisions of this section, it is within the contemplation of this act that no further claim be made by the city of Worcester to any further part of the watershed tributary to the Wachusett reservoir for water supply purposes.

SECTION 13. For the purpose of meeting expenditures required under the preceding section, the city of Worcester may borrow from time to time, within a period of eight years from the effective date of this act, such sums as may be necessary, not exceeding, in the aggregate, two million five hundred thousand dollars, and may issue bonds or notes therefor, which shall bear on their face the words, City of Worcester Water Loan, Act of 1926. Each authorized issue shall constitute a separate loan, and such loans shall be payable in not more than thirty years from their dates. Indebtedness incurred under this act shall be in excess of the statutory limit, but shall, except as herein provided, be subject to chapter forty-four of the General Laws.

SECTION 14. The said city shall, at the time of authorizing said loan or loans, provide for the payment thereof in accordance with section thirteen; and when a vote to

that effect has been passed, a sum which, with the income derived from water rates, will be sufficient to pay the annual expense of operating its water works and the interest as it accrues on the bonds or notes issued as aforesaid by the city and to make such payments on the principal as may be required under the provisions of said section thirteen shall, without further vote, be assessed by the assessors of the city annually thereafter in the same manner as other taxes, until the debt incurred by said loan or loans is extinguished.

Approved May 28, 1926.

Acts of 1927, Chapter 321.

An Act making Additional Provision for the Water Supply Needs of the Metropolitan Water District and for Communities which Now or Hereafter may require Water therefrom, by the Development of an Adequate Future Water Supply from the Swift River.

Whereas, The deferred operation of this act would in part defeat its purpose, therefore it is hereby declared to be an emergency law, necessary for the immediate preservation of the public convenience.

Be it enacted, etc., as follows:

Section 1. The metropolitan district water supply commission, established by chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six, hereinafter referred to as the commission, on behalf of the commonwealth, shall forthwith, for the purpose of adding to, extending and further developing the additional sources of water supply of the metropolitan water system provided for in said chapter three hundred and seventy-five, divert into the Wachusett reservoir of

the metropolitan water system the waters of the Swift river, and of Beaver brook, a tributary of the Ware river, by the construction of an extension, to the Swift river, of the aqueduct or tunnel between the Wachusett reservoir and the Ware river at or near Coldbrook provided for in said chapter three hundred and seventy-five, and by the construction of a temporary diversion dam as may be required at a point on the Swift river below the confluence of the east and middle branches or at a point on the east branch near the village of Greenwich, and ultimately by the construction of a dam across the Swift river at or near the boundary line between the towns of Ware and Enfield, and of a dam across Beaver brook at or near said boundary line, thereby creating a storage reservoir in the Swift river valley. No water shall be diverted or stored in any calendar day when the flow of the Swift river at or just above the village of Bondsville in the towns of Palmer and Belchertown is less than twenty million gallons; and there shall be discharged from any storage created by the commission above said village a sufficient amount of water to maintain, so far as such storage will allow, a flow of said river at said village of not less than twenty million gallons in each calendar day.

The commission may also divert into the aqueduct or tunnel between the Wachusett reservoir and the Ware river, provided for in said chapter three hundred and seventy-five, the waters of the Quinapoxet river at a point in the town of Holden about one mile westerly from the boundary line between the towns of Holden and West Boylston. The flow of the Quinapoxet river at said point of diversion shall not be diminished by said diversion to less than one million gallons in each calendar day.

The commission shall establish and maintain proper gauging stations, or such regulating devices as may be

convenient and practical, to limit the diversion of the waters of the Swift and Quinapoxet rivers as aforesaid and to establish and maintain the aforesaid flow of the Swift river at or just above Bondsville with reasonable accuracy. Copies of all records for the Swift river obtained at such stations or by such devices shall be open to inspection during reasonable office hours, and information shall be furnished from time to time, whenever reasonably requested, to any person owning or operating any mill or manufacturing establishment below the dam across the Swift river authorized by this act, or to the mayor of any city or the chairman of the board of selectmen of any town bordering on the Swift or Chicopee rivers.

All or any part of the flood waters of the Ware river, as defined in section four of chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six, authorized to be diverted at or near Coldbrook by said chapter three hundred and seventy-five, or of the waters of the Quinapoxet river herein authorized to be diverted, may be diverted, at such times as may be necessary or desirable for storage, into the Swift river reservoir pending the ultimate diversion thereof into the Wachusett reservoir.

SECTION 2. The commission may construct as a part of the metropolitan water system such aqueducts, tunnels, dams, reservoirs and other works as in its opinion may be necessary for the additions, extensions and developments authorized by this act and all structures and appurtenances that in the opinion of the commission are desirable as incidental or complementary to such additions, extensions and developments. The commission shall also collect and publish in its reports such information as to the geology of the region in which any of the works which it is authorized to construct may be located as may be of value in connection with the geological

history of the state. The works authorized by this act shall be of such dimensions, capacities and areas as the commission may determine, and may from time to time be enlarged or modified as the commission may determine; and may be so constructed, enlarged or modified as to allow for a future increase in capacity to take care of the diversion of other streams in substantial accordance with the plans and recommendations of the joint board on water supply needs and resources of the commonwealth as contained in its report to the general court in nineteen hundred and twenty-two printed as house document fifteen hundred and fifty of that year; but nothing in this act shall be held to authorize any taking or diversion of any waters of the Millers river water shed or to affirm the intention of taking at any future date any unutilized flood waters of said Millers river.

Except as otherwise in this act provided, all the property acquired and works constructed under this act shall when completed be turned over to the metropolitan district commission, and shall thereafter be maintained and operated by it as a part of the metropolitan water system under chapter ninety-two of the General Laws with all the powers and duties conferred by said chapter.

SECTION 3. In constructing the works authorized by this act the metropolitan district water supply commission shall proceed with the organization and in the manner provided by said chapter three hundred and seventy-five. All of the provisions of section two of said chapter three hundred and seventy-five relative to the employment of laborers, workmen and mechanics and relative to the appointment, removal and fixing of compensation of all employees of the commission, including the appointment and removal of a chief engineer, shall apply in carrying out the provisions of this act. None of the employees of the commission, whether appointed before or after the effective date of this act, shall become

members of the state retirement system, but those who are members thereof at the time of their employment may be continued therein.

SECTION 4. For any of the purposes of this act, or for the further protection of the purity of the waters to be diverted under this act, or for the purpose of providing for a future increase in the capacity of the Swift river reservoir, the commission on behalf of the commonwealth may, at any time and from time to time, take by eminent domain or acquire by purchase or otherwise, such lands, waters, water rights, easements and other property or interests in property, including any cemetery, as it may deem necessary or desirable; provided, however, that the amount of water to be let down into the Swift river as provided in section one of this act shall not be diminished by any taking under this act.

The commission shall take or otherwise acquire in fee all lands which will be submerged by the construction of dams and reservoirs under this act.

For any of the purposes of this act, the commission may take and use the waters of any great pond within the water shed of the Swift river, and thereafter any other public use of such great pond and the waters thereof shall cease.

The commission may also take and use, for the purposes of this act or of said chapter three hundred and seventy-five, any land or rights in land of the commonwealth upon such terms and conditions as may be agreed upon by the commission and the state department or other authority which at the time is vested by the commonwealth with the care and control of such lands or rights, and if the commission and such department or other authority cannot agree upon said terms and conditions, then such terms and conditions shall be fixed by the governor and council.

Any taking under this act, except as hereinbefore in

this section provided, may be in fee or otherwise, perpetual in duration or for a limited period of time, according as the commission shall determine and set forth in the order of taking.

All takings under this act of property or rights in property and all proceedings in relation to or growing out of such takings shall conform to the provisions of chapter seventy-nine of the General Laws, except in the following particulars:

(*a*) The commission need make no award of damages sustained by persons or corporations in their property by any such taking.

(*b*) The notice required by section eight of said chapter seventy-nine may be given at any time within one year after the recording of the order of taking as provided in section three of said chapter.

(*c*) Petitions for the assessment of damages under section fourteen of said chapter seventy-nine may be filed within two years after the recording of the order of taking provided for in said section three, but petitions for the assessment of damages for the taking of rights of diversion appurtenant to land not taken may be filed within two years after, and not before, the actual diversion. The last six lines of section sixteen of said chapter seventy-nine, beginning with the word "but" in line three, shall have no application to takings under this act.

(*d*) For all property taken under this act except rights of diversion appurtenant to land not taken, the right to damages shall vest upon the recording of the taking in the registry of deeds. For all rights of diversion taken under this act appurtenant to land not taken, the right to damages shall vest upon and not before the actual diversion of water.

At any time after the passage of this act, the commission before or after the actual diversion of water may

make such settlements as it may deem for the best interests of the commonwealth with any person or corporation who may be or has been damaged by any taking of or injury to his water rights under this act and in making any such settlements the commission may, subject to the approval of the governor and council, make a contract, which shall be in a form approved by the attorney general and shall be binding upon the commonwealth and such owner or person and his successors in title, with respect to the amount of the flow down the stream to which such water rights are appurtenant, or to the time and manner of such flow, or may agree to furnish in some other way a substitute for the water rights which have been or may be taken or injured. Such contract, if acknowledged by the owner or commission or any member of it before a justice of the peace or a notary public, may be recorded in the registry of deeds in the county in which the land to which such water rights are appurtenant is situated.

SECTION 5. Any person or corporation owning at the time of the passage of this act any real estate which is not taken or purchased for the reservoir or the protection of the waters thereof under the provisions of this act situated within the territory comprised in the towns of Dana, Enfield, Greenwich and Prescott or within those portions of the towns of Belchertown, Hardwick, Pelham, Petersham, New Salem, Shutesbury and Ware not more than one mile distant from land required to be purchased or taken in fee under the second paragraph of section four of this act which real estate is decreased in value by the carrying out of the provisions of this act, or any person or corporation owning at the time of the passage of this act an established business on land within territory defined in this paragraph, which business is decreased in value, whether by loss of custom or otherwise, by the carrying out of the provisions of this act

shall be entitled to recover damages in the manner hereinafter provided in this section. The commission, however, in its discretion, if it finds that any such person or corporation has an established business located near to but outside the areas defined in this paragraph which has been actually decreased in value by the carrying out of the provisions of this act and which person or corporation would have been entitled to damages under this section if located within the areas defined in this paragraph, may make such settlement by agreement with such person or corporation as it may deem just, but only upon the filing of a claim therefor within the time hereinafter provided in this section.

Any resident of the towns of Dana, Enfield, Greenwich, Prescott or New Salem at the date of the passage of this act who had been for the six months next previous thereto regularly employed therein in a manufacturing establishment or in an established business or upon any lands and is not the owner or part owner of any interest in any such business or lands who, by the carrying out of the provisions of this act, is deprived of such employment and obliged to seek other employment or has suffered a diminution in wages shall, if upon reasonable effort he has been unable to secure such employment or to avoid such diminution in wages, be entitled to recover either by agreement with the commission or in the manner hereinafter provided in this section his damages in loss or diminution of wages, not exceeding, however, the amount of wages received by him for the six months previous to such loss of employment. No person shall have any right of recovery for more than one such loss of employment or one such diminution in wages under the provisions of this paragraph and no person shall have the right to recover for both injury to an established business under the provisions of the preceding paragraph and for loss of employment therein.

Any wage earner who at the time of the passage of this act resides in the town of Dana, Enfield, Greenwich, Prescott or New Salem who makes no other claim for damages under this act shall in case he is forced by the carrying out of this act to remove to a locality more than eight miles from land required to be taken in fee under the second paragraph of section four of this act be repaid the actual cost of such removal to an amount not exceeding fifty dollars.

Any person or corporation claiming to be injured as provided in this section, if such person or corporation so elects, may, after November first, nineteen hundred and twenty-eight but not later than six months from the date of the annexation of the towns of Enfield, Greenwich and Prescott, as provided in section thirteen of this act, file with the commission a sworn statement of his claim, setting forth the facts upon which it is based and the amount claimed, and if the commission cannot agree with such claimant upon the amount of such damage, or if the payment agreed to of such claim is not made within six months after such sworn statement is filed, then for determination of his damages, such claimant may within sixty days thereafter file a sworn copy of such statement of claim with the board of referees hereinafter provided. A justice of the supreme judicial court, either in term time or vacation, upon application by the commission or any other party in interest and after publication, or such other notice as the court may order, shall from time to time as the need may exist appoint one or more boards of referees, each consisting of three disinterested persons for the determination of damages, and may after notice and hearing of any parties interested, fill any vacancy on such boards. The compensation of such referees shall be fixed by the supreme judicial court in its order of appointment, and the same, together with such expenses as may

Salem and Prescott in a general westerly direction to the point of beginning.

(*b*) There shall be annexed to the town of Dana, and thereby to Worcester county, those portions of the towns of Prescott and Greenwich, being portions of Hampshire county, bounded as follows: beginning at the point where the middle branch of the Swift river crosses the boundary line between the towns of Dana and Prescott and following the existing channel of said middle branch in a general southerly direction to its confluence with the east branch of said river; thence following the existing channel of said east branch in a general northeasterly direction to the boundary line between the towns of Greenwich and Hardwick; thence following the boundary line between the towns of Greenwich and Hardwick in a general northeasterly direction to its intersection with the boundary line of the town of Dana; thence following the boundary line between the towns of Dana and Greenwich in a general northerly direction to its intersection with the boundary line of the town of Prescott; thence following the boundary line between the towns of Dana and Prescott in a general northerly direction to the point of beginning.

(*c*) There shall be annexed to the town of Hardwick, and thereby to Worcester county, that portion of the town of Greenwich, being a portion of Hampshire county, bounded as follows: beginning at the most westerly corner stone on the boundary line between the towns of Hardwick and Greenwich located about two thirds of a mile southerly from the outlet of East pond; thence running due west to the existing channel of the east branch of the Swift river; thence following the existing channel of said east branch in a general northeasterly direction to its intersection with the boundary line between the towns of Hardwick and Greenwich; thence following said boundary line between the towns of Hardwick and Greenwich in a general southerly direction to the point of beginning.

(*d*) There shall be annexed to the town of Ware those portions of the towns of Greenwich and Enfield, all of said towns being in Hampshire county, bounded as follows: beginning at the aforesaid most westerly corner stone on the boundary line between the towns of Hardwick and Greenwich located about two thirds of a mile southerly from the outlet of East pond; thence running due west to the existing channel of the east branch of the Swift river; thence following the existing channel of said east branch and of the Swift river in a general southwesterly direction to the intersection of the boundary line of the towns of Ware, Belchertown and Enfield; thence following the boundary line between the towns of Ware and Enfield in a general easterly direction to its intersection with the boundary line of the town of Hardwick; thence following the boundary line between the towns of Hardwick and Enfield in a general northerly direction to its intersection with the boundary line of the town of Greenwich; thence following the boundary line between the towns of Hardwick and Greenwich in a general northerly direction to the point of beginning.

(*e*) There shall be annexed to the town of Belchertown that portion of the town of Enfield, both of said towns being in Hampshire county, bounded as follows: beginning at the intersection of the boundary lines of the towns of Belchertown, Pelham and Enfield; thence running due east to the existing channel of the west branch of the Swift river; thence following the existing channel of said west branch and of the Swift river in a general southerly direction to the boundary line between the towns of Belchertown and Enfield; thence following the boundary line between the towns of Belchertown and Enfield in a general northwesterly direction to the point of beginning.

(*f*) There shall be annexed to the town of Pelham that portion of the town of Enfield, both of said towns being in Hampshire county, bounded as follows: beginning at the intersection of the boundary lines of the towns of Belcher-

town, Pelham and Enfield; thence running due east to the existing channel of the west branch of the Swift river; thence following the existing channel of said west branch in a general northerly direction to the intersection of the boundary lines of the towns of Prescott, Pelham and Enfield; thence following the boundary line between the towns of Pelham and Enfield in a westerly and southerly direction to the point of beginning.

SECTION 14. All the property belonging to the towns of Enfield, Greenwich and Prescott shall upon the annexation of said towns to adjacent towns by authority of this act, vest in and become the property of the commonwealth for the benefit of the metropolitan water district, and the commonwealth shall succeed to all the rights, claims and causes of action of each of said towns, and shall assume and be liable for all the debts, obligations, trusts, duties and liabilities of each of said towns. All actions and causes of actions by or against the said towns of Enfield, Greenwich and Prescott pending or accrued, when such annexation takes effect, shall survive, and may be prosecuted to final judgment and execution by or against the commonwealth. All books, papers, monies and other property in the possession of the treasurer of each of these three towns or of any town officer thereof shall be turned over to the commission at the time of said annexation, and the commission shall wind up and liquidate the affairs of each such town as speedily as possible. Upon the final liquidation of the affairs of the towns of Enfield, Greenwich and Prescott, the commission shall turn over such of the records of said towns respectively as are of permanent value to the towns of Belchertown, Dana and New Salem, respectively, and said records shall be preserved with the records of the town to which they have been so turned over.

Upon such annexation the division of accounts of the

department of corporations and taxation shall audit the books and accounts of the collector of taxes of each of the towns of Enfield, Greenwich and Prescott, respectively, and all taxes assessed for the year of such annexation and remaining uncollected, except taxes assessed upon property acquired by the commission under the second paragraph of section four of this act, to persons residing or property located within the territory annexed to another town shall be, by the assessors of the town in which such taxes were assessed, committed to the collector of taxes of the town to which such territory is by the provisions of this act annexed. It shall be the duty of any collector of taxes to whom any such taxes are committed to complete the collection of such taxes with legal interest and costs and pay over the same to the treasurer of the town for which he is the collector.

Upon the annexation to adjacent towns of the territory within the towns of Enfield, Greenwich and Prescott as set forth in this act, the commission or the metropolitan district commission shall yearly in the month of November reimburse each of said adjacent towns for all money paid out or expenses incurred under the laws of the commonwealth for the year preceding in the relief or aid of persons whose settlement was gained in whole or in part whether by original acquisition or derivation within the territory annexed to each of said towns respectively prior to the date of such annexation.

SECTION 15. Annexation under this act shall constitute the annexed territory part of the town and the county to which it is annexed with respect to the jurisdiction of the courts, as well as for all other purposes. All suits, proceedings, complaints and prosecutions, and all matters of probate, which shall be pending at the time of such annexation before any court or trial justice, or such matters as may be incident thereto, may however be

heard and determined and prosecuted to final judgment and execution before such court or justice as if said annexation had not taken place; but upon such annexation taking place, the several courts and trial justices having jurisdiction over the respective towns to which the territory within said towns of Enfield, Greenwich and Prescott is annexed shall have jurisdiction of all civil actions, matters of probate and insolvency and criminal prosecutions thereafter begun, although the cause of action has accrued, or crime, offense or misdemeanor has been committed, before such annexation, in the same manner and to the same extent as if such territory had been annexed prior to the accrual of the cause of action or the commission of the crime, offense or misdemeanor.

SECTION 16. An inhabitant of the town of Enfield, Greenwich or Prescott, when annexed to an adjacent town by authority of this act, who remains upon the annexed territory, or who removes to a place within the limits of the town to which the land upon which he resided has been annexed, as such limits existed prior to such annexation, shall have the same right to vote at a town meeting in such town, or at an election of town officers, that he would have had if the annexed territory had constituted a part of said town for six months prior to such meeting or election.

SECTION 17. During any interval between the annexation of said towns of Enfield, Greenwich and Prescott and the taking possession of the land taken therein by the commission under this act, the commission shall maintain the public ways, public schools and other public works and public institutions in said towns to such extent and in such manner as the commission may deem necessary for the convenience, comfort and welfare of the inhabitants remaining therein.

SECTION 18. No person shall acquire against the commonwealth any rights by prescription or adverse possession in any lands or rights in lands of the commonwealth

acquired by the commission under the provisions of this act or of chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six.

SECTION 19. The commission may at any time sell at public or private sale, or exchange or lease any property, real or personal, or any easement or water right including any land in new cemeteries provided for in section nine of this act, whether taken by eminent domain or otherwise acquired, which in the opinion of the commission is no longer needed for the purposes of this act. Any sums of money so received shall be applied by the state treasurer to construction costs or to reduce the bonded indebtedness for the works. The commission, and after said works have been turned over to the metropolitan district commission, the metropolitan district commission, may by lease, license or contract permit the construction and maintenance on or over any land or waters under its control, of towers, poles, wires and other structures for the purpose of transmitting electric power, and may construct, maintain and operate such power plants and other structures as may in its opinion be necessary to utilize the fall of water created at any of the dams, channels, tunnels, or other structures under its control, for the production of power or electricity; may locate, construct and maintain lines for transmitting the same; and may use, sell or contract for the sale or use of any power or electricity so created, and any sums of money so received shall be applied to reduce the charges of maintenance of the metropolitan water district.

SECTION 20. The provisions of sections six and seven of chapter fifty-nine of the General Laws shall be applicable to land acquired in fee by the commission under this act for reservoir purposes or for the protection of the reservoir except to land within the present limits of the towns of Enfield, Greenwich and Prescott. On

the land in these three named towns acquired previous to the date of their annexation, the commission shall pay to each said town in which the respective land is located until such time as the annexation of said town, as provided in section thirteen of this act, a sum in lieu of taxes computed and paid as provided in said sections six and seven of said chapter fifty-nine, but including for this period the buildings and structures thereon. Subsequent to said annexation neither the commission nor the metropolitan district commission shall pay any taxes or make any payments in lieu of taxes on land or buildings within the present limits of the said towns of Enfield, Greenwich and Prescott.

As full compensation for any loss of taxation or any other loss caused by the carrying out of the provisions of this act, the commission shall pay to the county of Hampshire the sum of fifty-five thousand dollars, which sum shall be paid at the time of the annexation of the towns of Enfield, Greenwich and Prescott to adjacent towns.

SECTION 21. Whenever by the provisions of this act the commission is required to make annual payments over a period of years, it may by agreement with the parties interested make a settlement by payment of a liquidated amount, if it deems it advisable so to do.

SECTION 22. Any town or fire or water district on the water shed of the Swift river may take from this river above any dam constructed under this act across said river so much of the water thereof as it has already been or may hereafter be authorized by the legislature to take for supplying its inhabitants with water, and in case any such town or district shall hereafter on its application therefor be authorized to take such water, the point of connection with and entrance into said river or any pond, reservoir or waters thereof and the location of any pipes, aqueducts, conduits, wells or other water courses laid or

constructed on land of the commonwealth shall be determined by agreement between such town or district and the metropolitan district commission, and such town or district shall pay to the commonwealth for the account of the metropolitan water district, all damages to the land, structures or other property of the commonwealth caused by such taking, connection or entrance; and it shall further pay to the commonwealth for the account of the metropolitan water district, a fair proportion of the cost incurred by the commonwealth for the acquisition under the provisions of this act of the waters of said river, or rights therein, and for the construction, maintenance and operation of such works and structures as are authorized by this act, including a fair proportion of the cost of maintaining the purity of said water, the said damages and proportion to be determined by the metropolitan district commission and by such applicant town or district, and, if they cannot agree, such damages and proportion shall be determined by a master to be appointed by the supreme judicial court on petition by the commonwealth or said applicant town or district, and the report of the master, when affirmed by said court, shall be final and conclusive upon all parties.

SECTION 23. No persons shall, after the passage of this act, erect a dam for mill purposes across the Swift river, or any of its tributaries above the village of Bondsville, without the consent in writing of the commission, or, after said works have been turned over to the metropolitan district commission, of said metropolitan district commission. In granting its consent, either commission may impose such conditions as it may deem to be for the public interest. Any person who is constitutionally damaged in his property by the refusal of such consent or by the imposition of such conditions, may recover from the commonwealth the damage so caused in the manner provided in section four of this act.

SECTION 24. The supreme judicial court or any justice thereof and the superior court or any justice thereof, during a sitting of the court or in vacation, on the petition of the commission or of any city, town, corporation or person interested, or of the attorney of any such petitioner, shall have jurisdiction in equity or otherwise to enforce the provisions of this act and of any rule, regulation or order made under the authority of the same and to prevent any violation of said provisions, rules, regulations or order; provided, however, that no suit in which the right of the commission to make any taking authorized by this act is questioned shall be brought except in the supreme judicial court for the county in which said taking has been made or is to be made, nor unless the said suit is brought within six months after the passage of this act.

If any part, subdivision or section of this act shall be declared unconstitutional the validity of its remaining provisions shall not be affected thereby.

SECTION 25. All general laws relating to the water supplies of cities and towns or the lands and other property used for such supplies and the provisions of sections ten to twenty-three, inclusive, of chapter ninety-two of the General Laws shall in so far as they are not inconsistent with the provisions of this act apply to and be observed in carrying out the purposes of this act. The provisions of chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six shall continue in force except as modified by the provisions of this act, but nothing in this act shall be held to authorize any taking or diversion of the waters of the Ware river in excess of that authorized under the provisions of said chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six.

SECTION 26. Any church or religious society established in the towns of Dana, Enfield, Greenwich, New Salem or Prescott may within five years from the

passage of this act file in the probate court or in the supreme judicial court for the county in which such town is located a petition in equity representing that by reason of the construction of the reservoirs and other works contemplated by this act it will be impracticable for such church or religious society thereafter to continue its services of worship or otherwise to carry out the purposes for which it was established and thereupon, after such notice to the attorney general and other persons interested as the court in which such petition is filed may direct, said court may authorize such church or religious society to convey by deed all property real and personal held by it for its own purposes or upon any trust (including the beneficial interest in any trust property held for the benefit of such church or religious society, also any and all contingent rights and interests and any right to damages vested in such church or religious society under the terms of chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six or under the terms of this act) to such appropriate person or corporation as the court may determine, to be held and administered by such person or corporation in such manner and upon such trusts as the court may designate and may further direct that upon the making of such conveyance and upon the filing of a certified copy of the deed and of the decree authorizing the same in the office of the secretary of the commonwealth such church or religious corporation shall be deemed to be dissolved. If any property conveyed pursuant to a decree entered upon such petition shall thereafter be taken under the provisions of either of said acts, the person or corporation to which such property shall have been so conveyed shall have the same right to damages as such church or religious society would have had if it had not conveyed such property. Before entering a decree as hereinbefore pro-

vided, the court shall ascertain whether any rights by way of reverter or otherwise are vested in any person or corporation in any property held by or for the benefit of such church or religious society upon the dissolution of such church or religious society, the discontinuance of its activities, its ceasing to use said property or any other contingency, and, if it shall appear that a conveyance of any such property as hereinbefore provided would be inconsistent with any such rights, the court, if any action appears to be necessary in order to effect a lawful and complete disposition of such property, shall direct that the same be conveyed to the person or corporation found to be entitled thereto in the existing state of things or devise a plan for the application thereof in a manner consistent with such rights. The remedies hereby given shall be in addition to any remedies afforded by existing law.

SECTION 27. For the purpose of carrying out the provisions of this act, the commission may expend such amounts not exceeding in the aggregate fifty million dollars, as may from time to time be approved by the governor and council. To meet such expenditures, the state treasurer shall, from time to time, on the request of the commission and subject to such approval, issue bonds of the commonwealth to an amount not exceeding the sum of fifty million dollars, which shall be a further addition to the loans authorized by section eight of chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six, and by section six of chapter one hundred and eleven of the acts of nineteen hundred and twenty-seven.

Such bonds shall be issued as coupon or registered bonds, for such term of years as may be recommended by the governor, in accordance with section three of Article LXII of the amendments to the constitution, and shall bear interest at such rate as shall be fixed by

the state treasurer, with the approval of the governor and council. The amounts necessary to meet interest and serial payment requirements on said bonds and the expenses of maintaining and operating the works to be constructed by the commission under this act, and such other expenses as may be authorized hereunder, shall be added to the annual assessments upon the cities and towns comprising the metropolitan water district and apportioned and collected as provided by section twenty-six of chapter ninety-two of the General Laws.

Approved April 26, 1927.

FILE COPY

FILED
OCT 31 19
CHARLES ELMORE
CL

In the Supreme Court of the United States

OCTOBER TERM, 1929.

No. 12, ORIGINAL. IN EQUITY.

THE STATE OF CONNECTICUT,
Complainant,

v.

THE COMMONWEALTH OF MASSACHUSETTS,
Defendant.

MOTION OF THE COMMONWEALTH OF MASSACHUSETTS TO AMEND ANSWER TO THE BILL OF COMPLAINT.

JOSEPH E. WARNER,
Attorney General of Massachusetts.

BENTLEY W. WARREN,
Special Assistant Attorney General of Massachusetts.

GERALD J. CALLAHAN,
Assistant Attorney General of Massachusetts.

R. AMMI CUTTER,
Assistant Attorney General of Massachusetts.

In the
Supreme Court of the United States

OCTOBER TERM, 1929.

No. 13, ORIGINAL. IN EQUITY.

THE STATE OF CONNECTICUT,
Complainant,

v.

THE COMMONWEALTH OF MASSACHUSETTS,
Defendant.

NOTICE.

To the State of Connecticut, the complainant herein; to the Honorable Benjamin W. Alling, Attorney General of said State; and to Ernest L. Averill, Esq., and to Benedict M. Holden, Esq., both of Hartford, Connecticut, of counsel in said case:

Please take notice that at the incoming of the Supreme Court of the United States at twelve o'clock noon at the Capitol Building in the City of Washington, District of Columbia, on Monday, November 4, 1929, or as soon thereafter as counsel can be heard, the abovenamed defendant will appear by its attorneys and present to said court the attached motion for leave to file a motion to amend the defendant's answer.

THE COMMONWEALTH OF MASSACHUSETTS,

By JOSEPH E. WARNER,
Attorney General of Massachusetts.

BENTLEY W. WARREN,
Special Assistant Attorney General of Massachusetts.

GERALD J. CALLAHAN,
Assistant Attorney General of Massachusetts.

R. AMMI CUTTER,
Assistant Attorney General of Massachusetts.

THE STATE OF CONNECTICUT.

COUNTY OF

Service of the above notice by the delivery to me of a copy thereof, together with a copy of a motion for leave to file and a motion to amend the defendant's answer is hereby acknowledged this day of October, 1929.

In the
Supreme Court of the United States

OCTOBER TERM, 1929.

No. 13, ORIGINAL. IN EQUITY.

THE STATE OF CONNECTICUT,
Complainant,

v.

THE COMMONWEALTH OF MASSACHUSETTS,
Defendant.

MOTION OF THE COMMONWEALTH OF MASSACHUSETTS FOR LEAVE TO FILE MOTION TO AMEND ANSWER TO THE BILL OF COMPLAINT.

And now comes the Commonwealth of Massachusetts, by Joseph E. Warner, its Attorney General, and moves this Honorable Court for leave to file the attached motion to amend the answer heretofore filed by the said Commonwealth in the above-entitled action.

THE COMMONWEALTH OF MASSACHUSETTS,

By JOSEPH E. WARNER,
Attorney General of Massachusetts.

BENTLEY W. WARREN,
Special Assistant Attorney General of Massachusetts.

GERALD J. CALLAHAN,
Assistant Attorney General of Massachusetts.

R. AMMI CUTTER,
Assistant Attorney General of Massachusetts.

In the
Supreme Court of the United States

OCTOBER TERM, 1929.

NO. 13, ORIGINAL. IN EQUITY.

THE STATE OF CONNECTICUT,
Complainant,

v.

THE COMMONWEALTH OF MASSACHUSETTS,
Defendant.

MOTION OF THE COMMONWEALTH OF MASSACHUSETTS TO AMEND ANSWER TO THE BILL OF COMPLAINT.

And now comes the Commonwealth of Massachusetts, by Joseph E. Warner, its Attorney General, and moves this Honorable Court for leave to amend the answer heretofore filed by the said Commonwealth in the above-entitled action by leave of court in the following particulars.

1. By striking out that portion of paragraph 5 of the answer beginning with the words "But the defendant", in the twenty-third line on page six of the answer, and ending with the words "more fully described," in the first and second lines on page seven of the answer, and inserting in place thereof the following:

"But the defendant says

(*a*) that no such permit from Congress, the War Department, the Secretary of War, or the Chief of Engineers is necessary for the erection of any structures as such in a non-navigable river or stream.

(*b*) that the United States Government, the War Department thereof, the Secretary of War, and the Chief of Engineers have jurisdiction over the diversion of waters from non-navigable tributaries of navigable streams solely because such a diversion may result in the obstruction of the navigable capacity of a navigable stream into which such non-navigable stream may flow.

(*c*) that it is the duty of the Secretary of War and the Chief of Engineers to grant a permit for a diversion from a non-navigable stream, unless such diversion will result in an unreasonable obstruction of a navigable stream or will unreasonably alter or modify the capacity of the channel of a navigable water of the United States. The defendant admits that at the time of the filing of the bill of complaint in the proceedings before this Honorable Court the defendant had not obtained permission from the War Department or from the office of the Secretary of War of the United States to do any acts actually done or contemplated to be done by the Commonwealth of Massachusetts, referred to in the bill of complaint, for which any permit may be by law required.

The defendant avers, however,

(*a*) That on November 30, 1927, the Metropolitan District Water Supply Commission made a formal application for a permit to divert water from the Swift river and the Ware river in accordance with the terms of the two acts hereunto annexed and marked 'Appendix A'. No permit was requested for permission to erect any structures in the Swift river or in the Ware river, inasmuch as the said rivers are non-navigable streams and the jurisdiction of the War Department does not extend to regulation of the waters of such streams unless there is such a diversion or use of the waters of such streams as will unreasonably alter or modify the condition or capacity

of the channel of a navigable water of the United States into which such non-navigable streams eventually flow.

(*b*) That after extensive consideration and after public hearings by representatives of the War Department, it was found on March 14, 1928, upon recommendation of the Chief of Engineers and with the approval of the Secretary of War, that the proposed diversion of the waters of the Ware river in excess of 85,000,000 gallons per day (131 cubic feet per second) would have no adverse effect on the navigable capacity of the Connecticut river, and the War Department informed the applicant that no objection would be interposed by the department to the diversion of all flood waters in excess of 85,000,000 gallons per day for the period between October fifteenth and June fifteenth of each year. The application of the Metropolitan District Water Supply Commission of Massachusetts, together with the sixth endorsement thereupon by the Chief of Engineers and the Secretary of War and a copy of a communication submitted to and received by the Metropolitan District Water Supply Commission from the United States Engineer's office at Providence, Rhode Island, are hereunto annexed, marked 'Appendix B,' the said appendix being hereby referred to and made a part hereof.

(*c*) That after extensive consideration and after public hearings it was found by the War Department, upon recommendation of the Chief of Engineers and with the approval of the Secretary of War, on May 11, 1929, that a certain proportion of the diversion of the waters of the Swift river might properly take place without causing any unreasonable, appreciable, or substantial alteration or modification of the condition of, or of the navigable capacity of, the channel of the navigable portion of the Connecticut river, and the Metropolitan District Water Supply Commission

was informed that the War Department would interpose no objection to such a diversion within certain limits. A copy of the application for permission to divert certain waters of the Swift river filed by the Metropolitan District Water Supply Commission, together with the seventh endorsement of the War Department thereon, and a copy of the communication received by the Metropolitan District Water Supply Commission from the office of the District Engineer with respect to said diversion are hereunto annexed and marked 'Appendix C,' to which reference is herein made and which is made a part hereof."

2. By striking out that portion of paragraph 11 of the answer beginning with the words "And further answering," in the fourteenth line on page ten of the answer, and ending with the words "the Secretary of War," in the twenty-second line on page eleven of the answer, and inserting in place thereof the following:

"And further answering the defendant avers that in view of the determination of the Secretary of War, upon recommendation of the Chief of Engineers, that within the limits stated in the annexed findings of the department the proposed diversion of certain of the flood waters of the Ware river and of certain waters of the Swift river contemplated by the said defendant, the Commonwealth of Massachusetts, will have no adverse or injurious effect upon the navigability of the Connecticut river, and in view of the findings of the Chief of Engineers, approved by the Secretary of War, set forth in Appendices 'B' and 'C', attached hereunto and made a part hereof, no question of whether or not any act done or contemplated to be done by the Commonwealth of Massachusetts has or will have an adverse or injurious effect upon the navigability of the Connecticut river is here relevant or

material, in the absence of proof that the Commonwealth of Massachusetts has diverted or actually proposes to divert more water than it is permitted to divert by the terms of the orders of the War Department, inasmuch as the determination of such issues and the protection of the capacity of navigable streams in the interest of interstate and foreign commerce has been committed by the Constitution of the United States to the Congress, which has delegated the greater part of its administrative powers in that behalf to the War Department, to the Secretary of War, and to the Chief of Engineers. The defendant, however, avers that neither the diversions authorized by the Massachusetts legislation, annexed hereunto and made a part hereof and marked 'Appendix A', nor the said diversions as modified in accordance with the terms of the permission contained in the War Department's orders, annexed hereunto and made a part hereof and marked 'Appendix B' and 'Appendix C', will in any way unreasonably alter or modify the navigable capacity of the navigable portion of the Connecticut river; nor will the said diversions either as authorized by the Massachusetts legislation or as modified by the War Department's orders aforesaid cause any damage whatsoever to the health, welfare, safety, or property of the State of Connecticut or the citizens thereof."

3. By striking out so much of paragraph fifth of the answer as begins with the words "Inasmuch as," in the ninth line on page thirty of the answer, and as ends with the words "has no jurisdiction," in the twenty-first line on page thirty of the answer, and inserting in place thereof the following:

"Inasmuch as the duty of protecting the navigability of navigable waters of the United States and

the regulation of obstructions and diminutions of the navigable capacity of such waters has been committed, consistently with the provisions of the Constitution of the United States, by the Congress of the United States in large part to the Secretary of War, the Chief of Engineers, and the War Department, and in view of the determinations and findings of the Chief of Engineers, with the approval of the Secretary of War, as hereinbefore set forth and as more fully set out in said findings in Appendices 'B' and 'C', hereunto annexed and made a part hereof, within the limits provided in said findings, the issue of the effect of the proposed diversions upon the navigability of the Connecticut river is not open in these proceedings, in the absence of proof that the Commonwealth of Massachusetts has diverted or actually proposes to divert more water than it is permitted to divert by the terms of the orders of the War Department. The defendant, however, avers that neither the diversions authorized by the Massachusetts legislation, annexed hereunto and made a part hereof and marked 'Appendix A', nor the said diversions as modified in accordance with the terms of the permission contained in the War Department's orders, annexed hereunto and made a part hereof and marked 'Appendix B' and 'Appendix C', will in any way unreasonably alter or modify the navigable capacity of the navigable portion of the Connecticut river; nor will the said diversions either as authorized by the Massachusetts legislation or as modified by the War Department's orders aforesaid cause any damage what-

soever to the health, welfare, safety, or property of the State of Connecticut or the citizens thereof."

THE COMMONWEALTH OF MASSACHUSETTS,

By JOSEPH E. WARNER,
Attorney General
Of the Commonwealth of Massachusetts.

BENTLEY W. WARREN,
Special Assistant Attorney General
Of the Commonwealth of Massachusetts.

GERALD J. CALLAHAN,
Assistant Attorney General
Of the Commonwealth of Massachusetts.

R. AMMI CUTTER,
Assistant Attorney General
Of the Commonwealth of Massachusetts.

APPENDIX B

NOVEMBER 30, 1927.

WARE RIVER DIVERSION

War Department, United States Engineer Office, 13th Floor, Custom House, Boston, Mass.

GENTLEMEN: — The letter from your department, signed by S. A. Cheney, Colonel, Corps of Engineers, District Engineer, dated November 22, 1927, directed to this Commission in reference to the contemplated diversion of the waters of the Swift and Ware Rivers for the purpose of procuring an additional water supply for the Metropolitan District received.

The diversion of waters referred to is of the Ware River authorized by Chapter 375 of the Acts of 1926 (Massachusetts) and of the Swift River authorized by Chapter 321 of the Acts of 1927 (Massachusetts), both rivers being entirely within the State of Massachusetts and being non-navigable. Copies of both of these Acts are attached hereto.

In accordance with the letter from your department and as suggested by Colonel Cheney in a recent conference, this Commission hereby makes formal application for a permit for the diversion of the waters of the Ware River in accordance with the terms of Chapter 375 of the Acts of 1926 which provides so far as said diversion is concerned as follows:

> SECTION 1, Paragraph 2 — "The commission, on behalf of the commonwealth, shall forthwith for the purpose of extending and increasing the water supply of the metropolitan water system, and of such cities and towns not members of the metropolitan water district as may hereafter require water from said system, divert into the Wachusett reservoir of said district the flood waters, as defined in section four, of the Ware river at a point in the town of Oakham or the

town of Barre not more than one mile from the bridge of the Boston and Albany railroad crossing said river in the village of Coldbrook, and construct as a part of the metropolitan water system, such works as may be necessary for such extension and increase, and all structures and appurtenances incidental or complementary thereto; provided, that said flood waters shall not be so diverted between May thirty-first and December first in any year unless such diversion be first approved by the state department of public health."

SECTION 4, Paragraph 1 — "For the purposes of this act, the flood waters of the said Ware river which the commission is authorized to divert as provided in section one are hereby defined to be the waters thereof at and above the point of diversion established under section one in excess of a flow of eighty-five million gallons a day, meaning thereby that on any day when the natural flow of said river is less than eighty-five million gallons no water shall be diverted."

This matter was taken up by Mr. Winsor, Chief Engineer of this Commission, with Major Fowler of the Providence office early in the year, and it was our impression that if anything further was required on the part of the War Department, we would be notified. Work has been going on since that time and in view of the immediate necessity of the Boston Metropolitan District for an additional water supply, and the serious danger of a water shortage unless this work is prosecuted to the earliest possible completion, we cannot too strongly urge that a permit be immediately granted.

Respectfully,

METROPOLITAN DISTRICT WATER
SUPPLY COMMISSION,

By (Sgd) DAVIS B. KENISTON,
Chairman.

Incls:
DBK : CH

COPY

7510 (Mass. Metro. Dist. Water Comm.) 1. Subject: Application for permission to divert water from Ware River, Mass.

6TH IND.

Office, C. of E. March 6, 1928. — To the Secretary of War.

1. The Metropolitan District Water Supply Commission of the State of Massachusetts has made application for permits to divert excess waters from Ware River and the major part of the flow of the Swift River for an additional water supply for the Boston Metropolitan District. The particular application under consideration in this indorsement refers to the excess waters of the Ware River.

2. Both rivers lie wholly within the State of Massachusetts. They rise in the central part of the State, flow in a southerly direction and uniting with the Quaboag River, form the Chicopee River. The latter flows westward to the Connecticut River.

3. Both applications contemplate the transfer from the Connecticut basin of a portion of the waters naturally tributary thereto, and their diversion through a tunnel to another watershed. In the case of the Swift River it is proposed to construct a storage reservoir and a very large proportional diversion is requested. The application for the Swift River requires further detailed study to arrive at a close determination of its effects on the navigable capacity of the Connecticut. These studies have not progressed sufficiently to enable me to state at this time the amount of allowable diversion or exact conditions under which diversion may be possible without adverse effect on the Connecticut. No storage is proposed in the case of the Ware River and no diversion except when the flow is in excess of 85,000,000 gallons per day (about 131 cubic feet per

second), with the proviso that no water shall be diverted between May 31 and December 1 in any year unless first approved by the State Department of Public Health. The proposed Swift River diversion presents a complicated question. The Ware River application involves no unusual difficulties.

4. The drainage area of the Swift River above the lower end of the reservoir, is about 186 square miles. The drainage area of the Ware above the proposed point of diversion is about 98 square miles. The drainage area of the Connecticut is about 11,000 square miles.

5. Objections to the proposed diversion have been presented both in writing and orally by representatives of the State of Connecticut, the City of Hartford and the Hartford and New York Transportation Company. The Division Engineer has raised the question of the adverse effect on power development at Enfield Rapids, Conn. The State of Connecticut has instituted an action in the Supreme Court of the United States to restrain the taking of any part of the waters of the Ware, Swift and other rivers, basing its contention only incidentally on adverse effects on navigable capacity of the Connecticut.

6. After a study of the Ware River application had been made, the District Engineer of the Providence District held a public hearing at Springfield, on the 9th ultimo to give the States of Massachusetts and Connecticut and all interested parties opportunity to present their views. At the hearing no attempt was made by either side to controvert the finding set forth in the notice of hearing that the navigable depth of the Connecticut will not be affected by diversion between October 15 and June 15 except to the extent of an average of 0.6 of a day per year. . . .

7. The records of discharge of the Ware River for the years 1913–1926 indicate that a volume of flow in excess

of 131 cubic feet per second at the proposed point of diversion did not occur on any day between October 15 and June 15 of those years when the Hartford gauge at 8 a.m. was below 2 feet. The same records indicate that a volume of flow in excess of 131 cubic feet at the proposed point of diversion has occurred only on an average of 0.7 of a day per year when the Hartford gauge at 8 a.m. was below 3 feet. The maximum amount thus capable of diversion occurred on December 15, 1924, when the volume of flow was 170 cubic feet per second and the gauge reading at Hartford was 2.7 feet. The possible amount that could then have been diverted was 39 cubic feet per second. The effect on gauge heights or navigable depths by the diversion of that amount would be imperceptible. These flashy and insignificant occurrences on the Ware are not reflected by the gauge at Hartford as much as are wind and tide effects. . . .

8. . . . In my judgment the use of excess waters from the Ware, as outlined above, will not have any injurious effect on navigation irrespective of any diversion which may be authorized from the Swift. Furthermore a proper regulation of the Swift River by storage of flood waters may be actually beneficial by making possible an increase of flow during dry periods. By careful and economical usage flood stages may be slightly lowered, navigable depth slightly benefited and diversion of reasonable amounts for water supply made feasible.

9. The applicant is very desirous of a decision concerning the Ware River application as soon as possible. So far as the interests committed to this Department are concerned, I see no reason for deferring action in the case. In my opinion the proposed diversion of waters in excess of 85,000,000 gallons per day (131 cubic feet) will have no adverse effect on the navigable capacity of the Connecticut River. In view of the controversy before the Supreme Court, it seems inadvisable

to issue a formal permit for the present but to inform the applicant that no objection will be interposed by the War Department to the diversion of the flood waters exceeding 85,000,000 gallons per day for the period October 15 to June 15, of each year. Approval of this course of action is recommended.

(Signed) EDGAR JADWIN
Major General,
Chief of Engineers.

Approved March 14, 1928

(Signed) DWIGHT F. DAVIS,
Secretary of War.

War Department
United States Engineer Office
Providence, R. I.

Refer to file No. Comm. 64/1-104 March 19, 1928.

Metropolitan District Water Supply Commission, The Commonwealth of Massachusetts, 24 School Street, Boston, Massachusetts.

Gentlemen: — Referring to your application of November 30, 1927, for federal authority for the diversion of the flood waters of the Ware River for an additional water supply for the Boston Metropolitan District, this office has been directed by the Chief of Engineers to inform you that no objection will be interposed by the War Department to the diversion of the flood waters of the Ware River exceeding 85,000,000 gallons per day for the period October 16 to June 15 each year.

For and in the absence of Colonel S. A. Cheney, Corps of Engineers, District Engineer.

Very respectfully,

THOS. R. McELROE (Sgd.)
Chief Clerk.

APPENDIX C

November 30, 1927.

SWIFT RIVER DIVERSION

War Department, United States Engineer Office, 13th Floor, Custom House, Boston, Massachusetts.

Gentlemen: — The letter from your department signed by S. A. Cheney, Colonel, Corps of Engineers, District Engineer, dated November 22, 1927, directed to this Commission in reference to the contemplated diversion of the waters of the Swift and Ware Rivers for the purpose of procuring an additional water supply for the Metropolitan District received.

The diversion of waters referred to is of the Ware River authorized by Chapter 375 of the Acts of 1926 (Massachusetts) and of the Swift River authorized by Chapter 321 of the Acts of 1927 (Massachusetts), both rivers being entirely within the State of Massachusetts and being non-navigable. Copies of both of these Acts are attached hereto.

In accordance with the letter from your department and as suggested by Colonel Cheney in a recent conference, this Commission hereby makes formal application for a permit for the diversion of the waters of the Swift River in accordance with the terms of Chapter 321 of the Acts of 1927 which provides so far as said diversion is concerned as follows:

> Section 1, 1st Paragraph — "The metropolitan district water supply commission, established by chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six, hereinafter referred to as the commission, on behalf of the commonwealth, shall forthwith, for the purpose of adding to, extending and further developing the additional

sources of water supply of the metropolitan water system provided for in said chapter three hundred and seventy-five, divert into the Wachusett reservoir of the metropolitan water system the waters of the Swift River, and of Beaver brook, a tributary of the Ware river, by the construction of an extension, to the Swift river, of the aqueduct or tunnel between the Wachusett reservoir and the Ware river at or near Coldbrook provided for in said chapter three hundred and seventy-five, and by the construction of a temporary diversion dam as may be required at a point on the Swift river below the confluence of the east and middle branches or at a point on the east branch near the village of Greenwich, and ultimately by the construction of a dam across the Swift river at or near the boundary line between the towns of Ware and Enfield, and of a dam across Beaver Brook at or near said boundary line, thereby creating a storage reservoir in the Swift river valley. No water shall be diverted or stored in any calendar day when the flow of the Swift river at or just above the village of Bondsville in the towns of Palmer and Belchertown is less than twenty million gallons; and there shall be discharged from any storage created by the commission above said village a sufficient amount of water to maintain, so far as such storage will allow, a flow of said river at said village of not less than twenty million gallons in each calendar day."

This matter was taken up by Mr. Winsor, Chief Engineer of this Commission, with Major Fowler of the Providence office early in the year, and it was our impression that if anything further was required on the part of the War Department, we would be notified. Work has been going on since that time and in view of the immediate necessity of the Boston Metropolitan District for an additional water supply, and the serious

danger of a water shortage unless this work is prosecuted to the earliest possible completion, we cannot too strongly urge that a permit be immediately granted.

Respectfully,

METROPOLITAN DISTRICT WATER
SUPPLY COMMISSION,

By (sgd) DAVIS B. KENISTON,
Chairman.

Encls.
DKB: CH (Pw)

NOVEMBER 30, 1927.

WARE AND SWIFT RIVER DIVERSIONS.

War Department, United States Engineer Office, 13th Floor, Custom House, Boston, Massachusetts.

GENTLEMEN: — Supplementing the applications of November 30 from this Commission to the War Department for permits for the Swift and Ware River diversions, your attention is directed to the correspondence now in your files between Major R. F. Fowler, Corps of Engineers, District Engineer at Providence, and Frank E. Winsor, Chief Engineer of this Commission, covering the period from January 25 to March 9, 1927. This Commission inferred from this correspondence that the War department had taken or would take the view that the proposed diversion from the Ware River would be no detriment to the navigable depth of the Connecticut River and that the proposed diversion from the Swift River would not be objected to unless or until the War Department, after taking into account various other factors influencing the flow of the Connecticut, such as storage held and released by mills, power companies, etc. in ponds and storage reservoirs, should demonstrate that such diversion would reduce the navigable depth, in which case the War Department might require greater quantities to be released from time to time during the dry season.

The diversion of both the Swift and Ware Rivers is essentially one project so far as a practical and economical development of an additional water supply for the Boston Metropolitan District is concerned.

The Ware River diversion in effect skims off the flow as it occurs in excess of 85,000,000 gallons, which is equivalent to 1.34 cubic feet per second per square mile from the approximate 98 square miles of drainage area affected (prior to a recent survey this area was assumed

to be about 100 square miles). This flow of 1.34 cubic feet per second unaffected by the diversion is several times the average dry weather flow of the Ware River.

The Swift River diversion is from about 186 square miles and there is guaranteed a flow in the Swift River at Bondsville, about five miles below the proposed Swift River Reservoir, of 20,000,000 gallons a day, the drainage area at Bondsville being about 195 square miles. The guaranteed flow is 0.16 cubic feet per second per square mile. The drainage area of 186 square miles is 1.71% of the drainage area of the Connecticut River of 11,400 square miles and from this 186 square miles sufficient water is released to insure a flow of 0.16 cubic feet per second per square mile from 195 square miles of drainage area. There will be no reduction but a slight increase in the flow of the Swift River in the driest times and during the usual dry season the average reduction in flow of the Connecticut River will correspond to a reduction of drainage area of that river not greater than one per cent. The effect on the flow of the Connecticut River of so small a diversion will, it is believed, be immeasurable so far as reducing the navigable depth is concerned.

During the past year the Commission has expended a large amount of money on the Ware and Swift River projects, including the cost of sinking of shafts preparatory to the construction of the tunnel which is necessary for making available the flood waters of the Ware River. Satisfactory bids for the construction of the tunnel itself were received on November 18. This contract if awarded in the immediate future and if completed in the time specified will permit the diversion of Ware River water into the Wachusett Reservoir in the winter or spring of 1931, before which time no water can be diverted. To suspend operations at this time would not only involve the Commonwealth in a heavy financial loss, but would also delay procuring the additional supply of water badly needed by the Metropolitan District at the earliest possible date.

The Swift River diversion cannot be begun until the tunnel is extended from the Ware River to the Swift River and it is estimated that the earliest time at which water could be diverted from the Swift River would be during 1933.

There is inclosed herewith preliminary blueprint of plan, Accession 617, being a general plan of the Metropolitan Water Supply.

Respectfully,

METROPOLITAN DISTRICT WATER
SUPPLY COMMISSION,

By (Sgd) DAVIS B. KENISTON,
Chairman.

FEW : AW
Inclosure

COPY

7510 (Mass. Metro. Dist. Water Supply Com.) 2. Subject: Swift River Diversion.

7TH IND.

Office, C. of E., May 9, 1929. — To the Secretary of War.

1. On November 30, 1927, the Metropolitan District Water Supply Commission of Boston, at the written suggestion of the District Engineer, Providence District, made a formal application for a permit to divert water from the Swift River, Massachusetts, in accordance with the terms of Chapter 321 of the Acts of 1923 of that State. On the same date, the Commission also made application for a permit to divert water from the Ware River, Massachusetts, in accordance with the terms of Chapter 375 of the State Acts of 1926.

2. Those rivers rise in the central region of Massachusetts and flow southerly and westerly to a junction forming the Chicopee River which flows westerly and empties into the Connecticut at a point about 9.5 miles north of the boundary between Massachusetts and Connecticut.

3. On March 14, 1928, the Secretary of War approved a recommendation of the Chief of Engineers that the applicant be informed that no objection would be interposed by the War Department to the diversion from the Ware River of the flood waters exceeding 85,000,000 gallons per day for the period October 15 to June 15, of each year. This approval was given by the Secretary of War with the understanding that such action would not affect the consideration of the Swift River application.

4. The Swift River application contemplates the storage of its flow and its possible diversion with the exception of 20,000,000 gallons of water per day into the Wachusett Reservoir, situated about 30 miles eastward

of the point of diversion and in another watershed. Storage would be provided first by a temporary dam to be constructed below the confluence of the east and middle branches of the Swift River or at a point on the east branch near the village of Greenwich, and ultimately by the construction of a dam across the Swift River at or near the boundary of Ware and Enfield, and of a dam across Beaver Brook at or near said boundary line.

5. No permit is required for any of the diversion structures as the Swift River and its various branches, as well as Beaver Brook, are non-navigable streams. The jurisdiction of the War Department in cases of this kind begins when the appropriation or regulation of the waters of a non-navigable tributary is of such extent as "to alter or modify the . . . condition or capacity of . . . the channel of any navigable water of the United States". Since such alteration or modification without previous recommendation and authorization of the Chief of Engineers and the Secretary of War is unlawful, the War Department is interested in determining whether the amount of such appropriation or regulation would probably demand institution of Federal proceedings to preserve substantially the navigability of navigable waters.

6. This particular case has been studied in great detail during the past 17 months by the District Engineer at Providence, the Division Engineer at New York and the Office of the Chief of Engineers. Full opportunity has been given to the representatives of the Metropolitan District Water Supply Commission and of the State of Connecticut and other interested parties, to present data and to inform themselves of the progress of these studies.

7. The State of Connecticut presented objections based on both legal and engineering grounds. All such legal questions have been answered so far as concerns the interests entrusted to the Department. No attempt has been made to answer the fundamental questions of

law involved as to the right to divert water from one watershed to another, inasmuch as the State of Connecticut has instituted an action in the Supreme Court of the United States to restrain the taking of any part of the water of the Ware, Swift and other rivers. It is believed that the decision of such issues should be left to that tribunal. The objections which have been raised on engineering or navigation grounds are referred to later in this indorsement.

8. The watershed of the Connecticut River above the Massachusetts-Connecticut boundary is 9,915 square miles. The drainage area of the Swift River involved in this application is approximately 186 square miles. The mean annual discharge of the Connecticut River at the State Line is about 17,000 cubic feet per second and the mean annual discharge of the Swift River at the proposed dam site, about 300 cubic feet per second. The discharges of both rivers are affected and regulated to a considerable extent by mill and power dams which temporarily store water to suit occupational uses. The stage of the river at Hartford is indicated by a gauge at that point. The surface elevations are affected by tide and wind. The best information of normal flow conditions of the Connecticut River is afforded by the records of the United States Geological Survey gauge at Sunderland, Massachusetts, located on that river about as far above Hartford as the site of the proposed dam on the Swift River. Study of the gauge records indicate that critical stages normally occur between June 15 and November 15. The critical period for navigation is taken as from June 1 to November 30.

9. The legislation of the State of Massachusetts prescribes that there shall be maintained a minimum flow of water of 31 cubic feet per second at Bondsville at a gauge located on the Swift River below the site of the proposed impounding dam, and where the tributary drainage area is 8 square miles in excess of that above that dam.

10. The results of the studies made by and under the direction of this office were submitted for comment to the representatives of the Metropolitan Water Supply District of Boston and to the representatives of the State of Connecticut. Both groups were in this office many times in discussions and conferences on both the legal phases and the navigation features of the case. In general, the representatives of Massachusetts indicated originally the opinion that the Office of the Chief of Engineers was magnifying the effect on navigation of the proposed appropriation of water in excess of 31 cubic feet per second. They stressed the desirability of early action by the Department to define the limits beyond which Massachusetts could not appropriate water without violating the provisions of the River and Harbor Act of March 3, 1899. On the other hand, the representatives of the State of Connecticut claimed that the proposals of the Department would not assure a 2-foot stage on the Hartford gauge; furthermore, that the maintenance of a 3-foot gauge rather than a 2-foot gauge was a better measure of the navigable capacity of the Connecticut River. Principally, however, the representatives of Connecticut strongly urged against any action positive or negative or inferential which permitted or which would permit or acquiesce to any degree in any diversion from the watershed of the Connecticut River to any other watershed.

11. The applicant is very desirous of obtaining a definite statement as to the limits of appropriation of water from the non-navigable Swift River which may be possible without substantially altering the condition or capacity or the channel of the navigable Connecticut River. In addition to the exhaustive study of the engineering data pertinent to the interests committed to the War Department, this office has taken into consideration the possible bearing upon Department action in this matter of the decisions of the Supreme Court in the cases of the United States *vs.* Rio Grande Dam

Irrigation Company and of the State of Wisconsin and other states *vs.* the State of Illinois and Sanitary District of Chicago, both of which involve questions regarding diversions affecting navigable waters. In the action hereinafter suggested, it is felt that the proposed position of the War Department will in no way prejudice the litigation now pending before the Supreme Court.

It is recommended that the applicant be informed as follows:

(a) It is the duty of the War Department to institute proceedings to preserve the substantial navigability of navigable waters of the United States when the appropriation or regulation of the waters of a non-navigable tributary affects, substantially alters or modifies the condition or capacity of the channel of a navigable water.

(b) The War Department is unwilling to admit that the appropriation of water from the Swift River to the extent proposed in this application might not, on occasion, have an appreciable effect on the navigable capacity of the Connecticut River.

(c) Limited amounts of water may be appropriated from the Connecticut River basin above the Connecticut-Massachusetts State Line, without substantially diminishing the navigability of that stream within the limits of present navigability.

(d) It is found that a discharge of 4,900 cubic feet per second at Sunderland, Massachusetts, corresponds to average lower low tide gauge height of 2.1 at Hartford, Connecticut and that a discharge of 4,650 cubic feet per second at Sunderland corresponds to an average lower low tide gauge height of 2.0 at Hartford.

(e) From the studies of past records it appears there will be no substantial alteration or modification of the condition or navigable capacity of the channel of the navigable portion of the Connecticut River if the flow of water from the Swift River as provided in

the terms of Chapter 321, of the Acts of 1927 (Massachusetts) be augmented during the critical period from June 1 to November 30, both inclusive, so that the measured rate of discharge on the Swift River shall be 70 cubic feet per second on such days as the United States Geological Survey gauge at Sunderland, Massachusetts indicates the discharge of the Connecticut River at that point to be less than 4900 cubic feet per second and more than 4650 cubic feet per second and shall be further augmented so that the measured rate of discharge past the impounding dam on the Swift River shall be 110 cubic feet per second on such days as the Geological Survey gauge at Sunderland Massachusetts indicates the discharge on the Connecticut River at that point to be 4650 cubic feet per second or less.

(f) The rates of discharge set forth in subparagraph (e) are subject to review based on more complete data which may become available in the future.

12. Approval of this course of action is recommended.

[M. & R. DIV. (s) EDGAR JADWIN
May 10, 1929
Off. Sec. War]

EDGAR JADWIN,
Major General,
Chief of Engineers.

1 Inclo. viz;
Map showing proposed
plan of diversion.

Recommendation of 7th indorsement approved May 11, 1929.

[M & R Div. (s) JAMES W. GOOD,
May 11, 1929 *Secretary of War.*
Off. Sec. War[

Sub. 2/6 accpg.

MAY 11, 1929.

COPY

Address Reply to
THE DISTRICT ENGINEER
Room 419, New Federal Building
Providence, R. I.

WAR DEPARTMENT
UNITED STATES ENGINEER OFFICE
Providence, R. I.

MAY 17, 1929.

Refer to File No. Conn. 54/1-166

Metropolitan District Water Supply Commission, 24 School Street, Boston, Mass.

GENTLEMEN: — With reference to your application of November 30, 1927 for a permit to divert water from the Swift River, Massachusetts, in accordance with the terms of Chapter 321 of the Acts of 1923 of that State, I have been directed by the Chief of Engineers under date of May 13 to inform you as follows:

(a) It is the duty of the War Department to institute proceedings to preserve the substantial navigability of navigable waters of the United States when the appropriation or regulation of the waters of a non-navigable tributary affects, substantially alters or modifies the condition or capacity of the channel of a navigable water.

(b) The War Department is unwilling to admit that the appropriation of water from the Swift River to the extent proposed in this application might not, on occasion, have an appreciable effect on the navigable capacity of the Connecticut River.

(c) Limited amounts of water may be appropriated from the Connecticut River basin above the Connecticut-Massachusetts State Line, without substantially diminishing the navigability of that stream within the limits of present navigability.

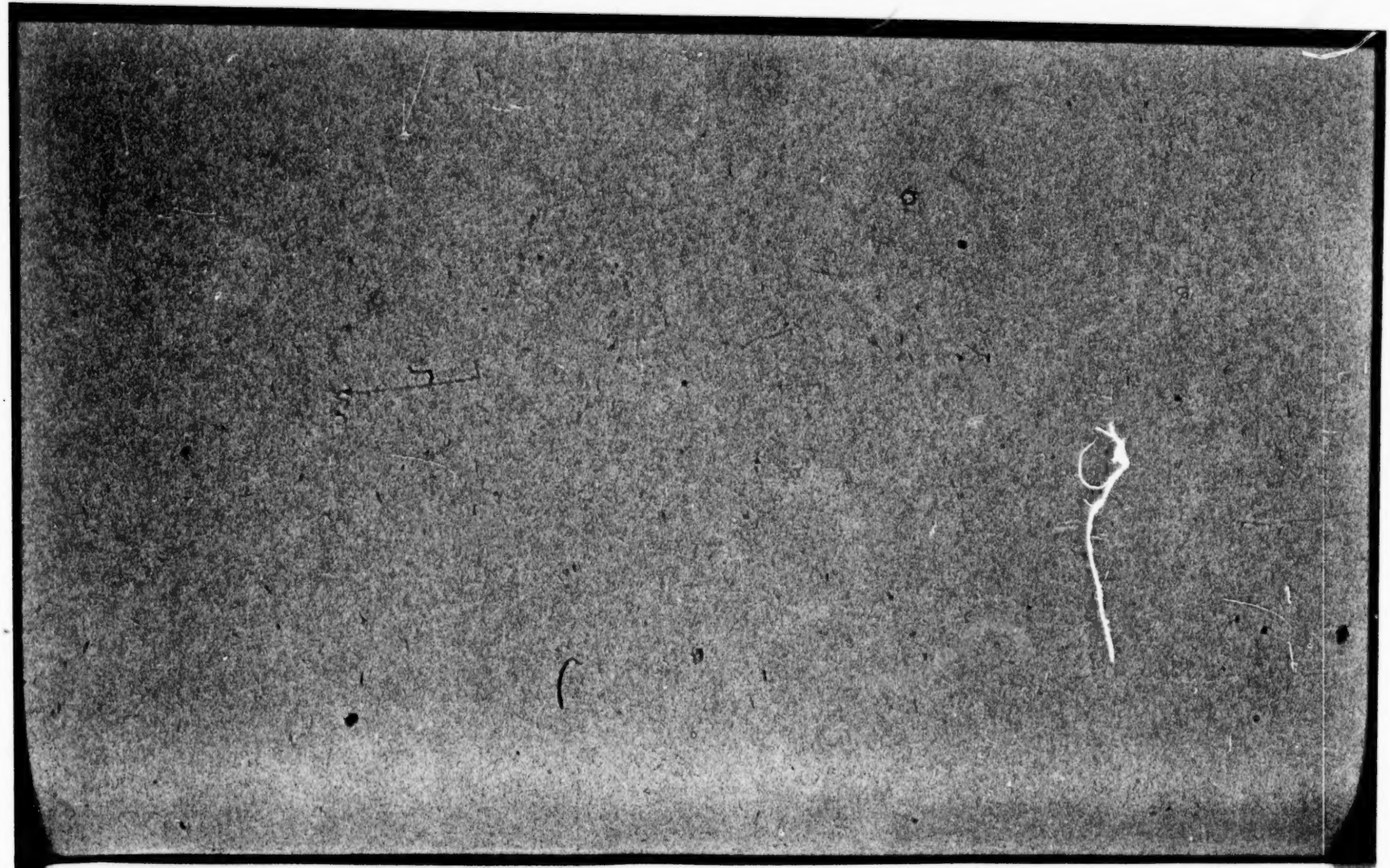
(d) It is found that a discharge of 4900 cubic feet per second at Sunderland, Massachusetts, corresponds to average lower low tide gauge height of 2.1 at Hartford, Connecticut and that a discharge of 4650 cubic feet per second at Sunderland corresponds to an average lower low tide gauge height of 2.0 at Hartford.

(e) From the studies of past records it appears there will be no substantial alteration or modification of the condition or navigable capacity of the channel of the navigable portion of the Connecticut River if the flow of water from the Swift River as provided in the terms of Chapter 321, of the Acts of 1927 (Massachusetts) be augmented during the critical period from June 1 to November 30, both inclusive, so that the measured rate of discharge on the Swift River shall be 70 cubic feet per second on such days as the United States Geological Survey gauge at Sunderland, Massachusetts indicates the discharge of the Connecticut River at that point to be less than 4900 cubic feet per second and more than 4650 cubic feet per second and shall be further augmented so that the measured rate of discharge past the impounding dam on the Swift River shall be 110 cubic feet per second on such days as the Geological Survey gauge at Sunderland, Massachusetts indicates the discharge on the Connecticut River at that point to be 4650 cubic feet per second or less.

(f) The rates of discharge set forth in subparagraph (e) are subject to review based on more complete data which may become available in the future.

Very respectfully,

(Signed) F. S. SKINNER
Major, Corps of Engineers,
District Engineer.



FILE COPY

FILED
JAN 15 193
CHARLES ELMORE CR
CLE

In the
Supreme Court of the United States.

OCTOBER TERM, 1929.

ORIGINAL NO. ~~13~~. 12

IN EQUITY.

THE STATE OF CONNECTICUT

v.

THE COMMONWEALTH OF MASSACHUSETTS.

REPRINT OF ANSWER OF DEFENDANT

THE COMMONWEALTH OF MASSACHUSETTS, INCLUDING AMENDMENTS ALLOWED DECEMBER 2, 1929.

JOSEPH E. WARNER, *Attorney General*
Of the Commonwealth of Massachusetts,

BENTLEY W. WARREN,
Special Assistant Attorney General
Of the Commonwealth of Massachusetts,

GERALD J. CALLAHAN,
R. AMMI CUTTER,
Assistant Attorneys General
Of the Commonwealth of Massachusetts,
Attorneys for the Defendant.

In the
Supreme Court of the United States.

OCTOBER TERM, 1929.

ORIGINAL NO. 13.

IN EQUITY.

STATE OF CONNECTICUT

v.

THE COMMONWEALTH OF MASSACHUSETTS.

MOTION FOR LEAVE TO FILE REPRINT OF ANSWER.

And now comes the defendant in the above-entitled case and moves for leave to file a reprint of the answer heretofore filed by leave of court on March 5, 1928, revised so as to include the amendments allowed by leave of court on December 2, 1929. The said amendments have been consolidated with the material in the original answer and certain minor errata have been corrected.*

JOSEPH E. WARNER,
Attorney General
of the Commonwealth of Massachusetts.

BENTLEY W. WARREN,
Special Assistant Attorney General
of the Commonwealth of Massachusetts.

GERALD J. CALLAHAN,
R. AMMI CUTTER,
Assistant Attorneys General
of the Commonwealth of Massachusetts.

* These corrections involve merely the headings of the letters in Appendices "B" and "C", appearing, *infra*, pp. 81, 89, 92.

In the
Supreme Court of the United States.

OCTOBER TERM, 1929.*

No. 13. ORIGINAL. IN EQUITY.

THE STATE OF CONNECTICUT,
Complainant,

v.

THE COMMONWEALTH OF MASSACHUSETTS,
Defendant.

ANSWER TO THE BILL OF COMPLAINT.†

And now comes the Commonwealth of Massachusetts by Joseph E. Warner, its Attorney General,‡ and for answer to the bill of complaint heretofore filed by leave of court by the State of Connecticut says as follows:

1. The defendant admits the material allegations of fact, if any such there be, contained in the first paragraph of the bill of complaint, set forth on page one of the printed bill.

2. Answering the second paragraph, set forth on page two of the printed bill of complaint, the defendant admits that the State of Connecticut was one of the "Thirteen Original Colonies" and that said State was a party to the original adoption of the Constitution of the United States; that said State, through its duly constituted authorities, has exercised sovereign power under said Constitution over such lands, waters, and other prop-

* October term 1927, No. 14.
† Original answer filed by leave of court on March 5, 1928.
‡ Succeeding Arthur K. Reading, resigned June 6, 1928.

erties as are now comprised within the territorial limits of the State of Connecticut since the adoption of such Constitution, but the defendant says that such sovereign power of the State of Connecticut is subject to the superior power of the Government of the United States in so far as regulatory power is given to the Government of the United States under the Constitution of the United States. As to whether or not said State has succeeded to all the rights, properties, duties, and obligations created by charter granted in 1662 by King Charles the Second, King of Great Britain, the defendant is ignorant and says that if the allegations to that effect are material allegations of fact it can neither affirm nor deny the same, but leaves the complainant to prove the same if and in so far as they may be material. The defendant denies that a great portion of the Connecticut River is included within the territorial limits of the State of Connecticut and that all of the portion of said river actually so included is navigable.

3. Answering the third paragraph set forth on pages two and three, of the printed bill of complaint, the defendant admits that it was one of the original Colonies and was a party to the Constitution of the United States; that at the time of the adoption of said Constitution the said defendant was a body politic organized for the usual governmental purposes and exercising sovereignty over the territory within its then defined limits, which included a portion of the Connecticut River and a portion of many of the tributaries of said river, including those specifically set out in said third paragraph of the bill of complaint. The defendant denies that the Swift River, the Ware River, and the Quaboag River flow directly into the Connecticut River, but avers that the Swift River flows into the Ware River about seven-tenths (7/10) of a mile above the village of Three Rivers in the town of Palmer, at which village the Quaboag

flows into the joint waters of the Ware and Swift rivers, forming as a result of said confluence a river known as the Chicopee River, which flows in a general westerly direction about seventeen miles emptying then directly into the Connecticut River. The defendant denies that the waters of all or any of said tributaries are necessary to maintain and preserve the flow of said Connecticut River.

4. Answering the fourth paragraph, set forth on page three, of the printed bill of complaint, the defendant denies each and every material allegation of fact therein contained, if any such there be, except that the defendant admits that the Commonwealth of Massachusetts has exclusive control and power of regulation of all water within its territorial limits and that such sovereignty over the waters within the territorial limits of the said State of Connecticut and of the Commonwealth of Massachusetts as may be exercised by the respective State and Commonwealth is subject to such rights as have been conferred upon the United States of America by the Constitution of the United States in the interests of interstate commerce and for the protection of the navigability of streams, wherever the same may be situated. The defendant further says that if the law of the State of Connecticut with respect to the control and power of regulation of the waters within the territorial limits of said State is here material, the defendant is ignorant of the same and leaves the complainant to prove the same in so far as it may be material. And further answering the defendant says that by the law both of the Commonwealth of Massachusetts and of the State of Connecticut owners of riparian lands are entitled to make reasonable and equitable use of the waters of streams flowing by or through their lands providing that such use is not inconsistent with a similar reasonable and equitable use of the said stream by lower riparian owners.

necessarily be incurred by the said referees, shall if approved by the said court be paid by the commission. The board shall determine its procedure including all matters relating to the form and place of application subject to the approval of said court. Upon reference of any claim within the provisions of this section, and after notice to the parties and hearing thereon, the board shall determine the amount of damages suffered and shall certify its findings to the commission; which findings shall be conclusive upon all parties except that any party in interest aggrieved by a ruling of the referees on a question of law may object thereto and the supreme judicial court shall have power to review and modify any finding to the extent that it may be an error in that respect, but not otherwise. If any person or corporation has a claim for damage under this section and also a claim for damages to property or rights in property within the provisions of section four of this act, the referees to whom said first named claim is referred under the provisions of this section shall, upon written application by the claimant, with the assent of the commission, have jurisdiction to determine both said claims.

Any person or corporation presenting a claim under this section for decrease in value of any parcel of land or of a business shall have no further claim under this section for damages to such land or business and all existing claims whether for damages to land, business or employment shall be included in one statement.

No right to recover damages or to receive any payment under this section shall be assignable, but any such right shall survive to the heirs at law of the party entitled.

SECTION 6. Prior to the taking under section four of this act of any land or rights in land within the territory described in the first paragraph of section five of this act which will be required for the reservoir or the protection

of the waters thereof, the owner of any such land or rights in land may at any time after November first, nineteen hundred and twenty-eight, if he so elects, file with the commission a sworn statement of the location, nature and extent of such land or rights together with such further information as the commission may require, the sum he is willing to accept therefor and a request that such land or rights be acquired. If in the opinion of the commission such land or rights are within the said territory and will be required, it shall with all due diligence make a search of the title and if it deems it necessary a survey, and shall furnish said owner with a statement of any defects in the title. As soon thereafter as the owner delivers to the commission a deed and all other instruments necessary to convey to the commonwealth a merchantable title to such land or rights and files a sworn copy of said statement with the board of referees, as provided in section five of this act, he shall have a claim for damages for the value of such land or rights, which value said board shall determine, as provided in said section five, unless a settlement has been previously effected by agreement. The said board shall certify its findings to the commission and the owner, which said findings shall be conclusive upon all parties except as otherwise provided in said section five.

In determining the value of any land acquired under this section within the territory described in the first paragraph of section five of this act, or the damage to any business as provided in the first paragraph of said section five, said board of referees may include in such value of land or damage to business such depreciation of value of land or decrease in value of business, if any, in addition to any damages which would otherwise accrue, as in the opinion of the said board may have been caused between January first, nineteen hundred and twenty-six, and the date of the passage of this act by reason of proposed legislation resulting in this act.

The board of referees may consider as an element of damage, in determining the value of any land used for farming purposes acquired under this section and owned at the date of the passage of this act by a person whose principal business is farming and who is no longer to continue that occupation in that neighborhood, any difference between the fair value of tools and implements used by him for farming purposes and the value thereof at a forced sale.

SECTION 7. The commission may either before a taking or afterward make such settlements as it may deem for the best interests of the commonwealth with any person or corporation having a valid claim under this act.

SECTION 8. If any public ways are within the area taken in fee by the commission, such portions thereof as the commission shall determine shall, at such time after such taking as the commission shall so notify the public authorities charged with their continuance and maintenance, be discontinued. The commission shall provide, when reasonably practicable, and public necessity or convenience require, other suitable ways in lieu of those discontinued, and may acquire by purchase or otherwise as provided by this act any lands or rights in land needed therefor. The practicability, public necessity and convenience and the location and character of any such new ways shall be determined by agreement between the commission and the county commissioners of the county or counties in which any discontinued way is situated, or, if they are unable to agree, by the department of public works.

The commission shall cause such public ways as it shall establish or alter under the provisions of this section to be constructed and graded so that they shall be reasonably safe and convenient for travel, and shall upon the completion of such ways give written notice

to the selectmen of the town in which each such way or portion thereof is located that such way is open for travel, and thereafter such ways or parts thereof shall be maintained and kept in repair by the towns in which they are located. If however the total highway mileage other than state highways within such portion of any town as is not taken or acquired in fee under the second paragraph of section four of this act shall because of the relocations caused by the carrying out of this act exceed the mileage in such portion of said town at the time of the passage of this act, said commission shall pay to such town any amount which the governor and council shall deem proper for the added burden for the future care and maintenance of such additional highway mileage.

Any public ways or portions thereof within the area taken in fee by the commission shall, until such time as they may be discontinued as provided in this section, continue to be maintained as highways with the same rights and duties of counties, towns and other parties as before such taking, except that such public ways in the towns of Enfield, Greenwich and Prescott shall, after the annexation of said towns, as hereinafter provided, be maintained by the commission to the extent and in the manner provided in section seventeen of this act.

SECTION 9. If any burial ground, cemetery, grave or place of human burial is within the area taken in fee by the commission, or is located so near to the reservoir or other waterway as to be liable to pollute or reduce the quality or value of any such waters as a potable water supply, the commission shall remove the remains found in any such burial places. The commission may agree with the next of kin, or other persons having the right to represent or dispose of such remains, as to the place or places to and in which such remains shall be removed and reinterred, and in such case the commission may pay

the reasonable cost of a burial lot and shall pay the expenses reasonably necessary for such removal, including the removal and resetting of the gravestones, monuments and markers of such graves. In any case where such next of kin or other persons are unknown or unascertainable, or where there is no such agreement, the commission shall furnish a place or places for such reburials, and may establish a general burial ground or grounds therefor, and subject to the provisions of section thirty-five of chapter one hundred fourteen of the General Laws, may acquire by purchase or otherwise as provided by this act any lands needed therefor. Any such general burial ground or grounds shall upon their completion be transferred to such trustees, persons, municipalities or public officers as may be agreed upon by the parties at interest, and in case no such agreement is made, then to the body corporate or to the public officials charged with the care of cemeteries in the town in which such burial ground is located, and any such agreement or transfer shall include the transfer of any trust funds established for the benefit or care of the cemetery or lots therein which contained remains thus removed to such general burial ground and upon any such transfer of a general burial ground, the commission shall pay to the body corporate or public officials to whom such transfer is made such additional sum as the governor and council shall deem to be requisite and reasonable for the care, maintenance and preservation of such burial ground.

Such removal of bodies shall be made without undue delay upon the request of the descendants or relatives of such deceased persons or of such persons as appear to the commission to be entitled to ask for such removal. Before any existing burial ground is submerged, all bodies, tombs and monuments shall be removed. After a suitable burial ground has been provided by the com-

mission no burial shall be made in any burial ground which will be flowed or affected by the carrying out of this act, but the bodies of any persons which would otherwise be entitled to burial in such burial ground may be buried in such lot in the new burial ground as may be provided by the commission. To whatever cemetery a body may be removed, if the lot from which the body has been taken was under perpetual care, then the additional cost, if any, for perpetual care in the place of removal to an amount not exceeding one hundred dollars shall be provided by the commission for the lot to which removal has been made.

The commission in carrying out the provisions of this section shall conform to any reasonable requirements of the board of health of the town in which any burial ground so flowed or otherwise affected is situated.

SECTION 10. The commission may alter, relocate or discontinue the whole or any parts of any rights of way belonging to any railroad corporation or electric transmission company and in case of such alteration or relocation may construct upon existing or other locations parts of the railroad or transmission line to take the place of the parts so discontinued, or the railroad or transmission line, any part of which is taken, may in whole or in part be discontinued or abandoned as and in such manner as shall be mutually agreed upon by the commission and the board of directors of the railroad corporation or electric transmission company subject to such approval as is required by law of any state or federal authorities, and if the commission and such companies cannot agree thereon, then as and in such manner as shall be determined, on the application in writing of either party, by the department of public utilities, which is hereby authorized and directed to adjudicate finally upon all questions relative thereto, subject to such approval of any federal authorities as is

required by law. If the commission shall be of the opinion that any such alteration or construction requires that lands or rights therein be taken therefor, the commission may take or acquire by purchase or otherwise, as provided by this act, such lands or rights therein and may convey the same to the railroad corporation or electric transmission company to be thereafter held and used as the property of such corporation or company for railroad or transmission line purposes, and such railroad corporation or electric transmission company may file a description of said relocation with the county commissioners and may maintain and operate said relocated lines of railroad or transmission lines with the same powers, rights and duties as in the case of the original lines.

The provisions of section five of this act shall not apply to railroad corporations or to electric transmission companies engaged in supplying electricity in bulk, as such term is defined in section one of chapter one hundred and sixty-four of the General Laws, or to other public utilities directly engaged in interstate commerce.

In any claim by any railroad corporation or electric transmission company for damages arising from the carrying out of this act, the relocation of the railroad or electric transmission line right of way of such corporation or company may be shown in mitigation of damages.

SECTION 11. In carrying out the powers and duties conferred upon it by this act the commission may construct and maintain dams, buildings, machinery, roads, conduits and aqueducts, may lay and maintain pipes, drains and wires, may alter or change the grade or direction of any water course, may carry and conduct any aqueduct, conduit, pipe, drain, or wire under or over any water course or any railroad, street or other way in such a manner as not unnecessarily to obstruct or

impede travel thereon, may dig up any such road, street or way and lay, maintain and repair aqueducts, conduits, pipes, wires and other works, beneath the surface thereof, conforming to any reasonable regulations made by the mayor and aldermen of cities and the selectmen of towns, respectively, wherein such works are performed and restoring, so far as practicable, any such road, street, or way to as good order and condition as the same was in when such digging was commenced; may make such surveys and borings and do such other preliminary work on private lands as it may determine to be necessary or desirable, doing as little damage as possible and paying for the same; may enter upon and use land owned by others and, so far as practicable, shall heed all reasonable requests made by such owners; and in general may do any other act or thing necessary or proper for carrying out the powers and duties conferred upon it by this act.

The commission shall have exclusive right and control during construction and until turned over to the metropolitan district commission or to others as authorized in this act, of all properties, ponds, water sources, cemetery sites and other works of every description purchased or taken by the commission or constructed by it under this act, and may order any or all persons to keep from entry in or upon the same and shall, through their agents, have full power to carry out these provisions with respect thereto, and the courts having jurisdiction shall have full authority for the enforcement of the provisions of this section.

The commission shall provide, or may agree with the local authorities in any town in which work is done under this act to pay for such additional police protection as is made necessary by the doing of such work.

No town within which are included the areas of Enfield, Greenwich or Prescott taken in fee for reservoir purposes

or for reservoir protection shall be required after the completion of the reservoir to bear any costs of or expenses for schools, policing or fire, gypsy moth or other insect pest protection within said reservoir areas described in this paragraph.

SECTION 12. Any town, other than Enfield, Greenwich or Prescott, from which any property which it holds in its private or proprietary capacity is taken under this act or which is otherwise constitutionally entitled to compensation for damage suffered under this act, may recover such damage from the commonwealth, in the manner provided by section four of this act.

SECTION 13. Upon the expiration of thirty days from the recording of an order of taking as provided by section four of this act by which taking, together with previous purchases or takings as provided by said section four, of land in the towns of Enfield, Greenwich and Prescott, the whole or a substantial part of said towns is taken, and after notice thereof to the towns to be affected by annexation as hereinafter described in this section, the territory within the towns of Enfield, Greenwich and Prescott shall be annexed to the adjacent towns, and to the counties in which such adjacent towns are located in the following manner:

(*a*) There shall be annexed to the town of New Salem, and thereby to Franklin county, those portions of the towns of Prescott, Greenwich and Enfield, being portions of Hampshire county, bounded as follows: beginning at the intersection of the boundary lines of the towns of New Salem, Prescott and Shutesbury and following the existing channel of the west branch of the Swift river in a general southerly direction to its confluence with the Swift river; thence following the existing channel of the Swift river and its middle branch in a general northeasterly direction to the point where it is crossed by the boundary line between the towns of

Prescott and Dana; thence following the boundary line between the towns of Prescott and Dana in a general northerly direction to its intersection with the boundary line of the town of New Salem; thence following the boundary line between the towns of New Salem and Prescott in a general westerly direction to the point of beginning.

(*b*) There shall be annexed to the town of Dana, and thereby to Worcester county, those portions of the towns of Prescott and Greenwich, being portions of Hampshire county, bounded as follows: beginning at the point where the middle branch of the Swift river crosses the boundary line between the towns of Dana and Prescott and following the existing channel of said middle branch in a general southerly direction to its confluence with the east branch of said river; thence following the existing channel of said east branch in a general northeasterly direction to the boundary line between the towns of Greenwich and Hardwick; thence following the boundary line between the towns of Greenwich and Hardwick in a general northeasterly direction to its intersection with the boundary line of the town of Dana; thence following the boundary line between the towns of Dana and Greenwich in a general northerly direction to its intersection with the boundary line of the town of Prescott; thence following the boundary line between the towns of Dana and Prescott in a general northerly direction to the point of beginning.

(*c*) There shall be annexed to the town of Hardwick, and thereby to Worcester county, that portion of the town of Greenwich, being a portion of Hampshire county, bounded as follows: beginning at the most westerly corner stone on the boundary line between the towns of Hardwick and Greenwich located about two thirds of a mile southerly from the outlet of East pond; thence running due west to the existing channel of the east

branch of the Swift river; thence following the existing channel of said east branch in a general northeasterly direction to its intersection with the boundary line between the towns of Hardwick and Greenwich; thence following said boundary line between the towns of Hardwick and Greenwich in a general southerly direction to the point of beginning.

(*d*) There shall be annexed to the town of Ware those portions of the towns of Greenwich and Enfield, all of said towns being in Hampshire county, bounded as follows: beginning at the aforesaid most westerly corner stone on the boundary line between the towns of Hardwick and Greenwich located about two thirds of a mile southerly from the outlet of East pond; thence running due west to the existing channel of the east branch of the Swift river; thence following the existing channel of said east branch and of the Swift river in a general southwesterly direction to the intersection of the boundary line of the towns of Ware, Belchertown and Enfield; thence following the boundary line between the towns of Ware and Enfield in a general easterly direction to its intersection with the boundary line of the town of Hardwick; thence following the boundary line between the towns of Hardwick and Enfield in a general northerly direction to its intersection with the boundary line of the town of Greenwich; thence following the boundary line between the towns of Hardwick and Greenwich in a general northerly direction to the point of beginning.

(*e*) There shall be annexed to the town of Belchertown that portion of the town of Enfield, both of said towns being in Hampshire county, bounded as follows: beginning at the intersection of the boundary lines of the towns of Belchertown, Pelham and Enfield; thence running due east to the existing channel of the west branch of the Swift river; thence following the existing channel of said west branch and of the Swift river in a general

southerly direction to the boundary line between the towns of Belchertown and Enfield; thence following the boundary line between the towns of Belchertown and Enfield in a general northwesterly direction to the point of beginning.

(*f*) There shall be annexed to the town of Pelham that portion of the town of Enfield, both of said towns being in Hampshire county, bounded as follows: beginning at the intersection of the boundary lines of the towns of Belchertown, Pelham and Enfield; thence running due east to the existing channel of the west branch of the Swift river; thence following the existing channel of said west branch in a general northerly direction to the intersection of the boundary lines of the towns of Prescott, Pelham and Enfield; thence following the boundary line between the towns of Pelham and Enfield in a westerly and southerly direction to the point of beginning.

SECTION 14. All the property belonging to the towns of Enfield, Greenwich and Prescott shall upon the annexation of said towns to adjacent towns by authority of this act, vest in and become the property of the commonwealth for the benefit of the metropolitan water district, and the commonwealth shall succeed to all the rights, claims and causes of action of each of said towns, and shall assume and be liable for all the debts, obligations, trusts, duties and liabilities of each of said towns. All actions and causes of actions by or against the said towns of Enfield, Greenwich and Prescott pending or accrued, when such annexation takes effect, shall survive, and may be prosecuted to final judgment and execution by or against the commonwealth. All books, papers, monies and other property in the possession of the treasurer of each of these three towns or of any town officer thereof shall be turned over to the commission at the time of said annexation, and the commission shall wind up and liquidate the affairs of each such town as

speedily as possible. Upon the final liquidation of the affairs of the towns of Enfield, Greenwich and Prescott, the commission shall turn over such of the records of said towns respectively as are of permanent value to the towns of Belchertown, Dana and New Salem, respectively, and said records shall be preserved with the records of the town to which they have been so turned over.

Upon such annexation the division of accounts of the department of corporations and taxation shall audit the books and accounts of the collector of taxes of each of the towns of Enfield, Greenwich and Prescott, respectively, and all taxes assessed for the year of such annexation and remaining uncollected, except taxes assessed upon property acquired by the commission under the second paragraph of section four of this act, to persons residing or property located within the territory annexed to another town shall be, by the assessors of the town in which such taxes were assessed, committed to the collector of taxes of the town to which such territory is by the provisions of this act annexed. It shall be the duty of any collector of taxes to whom any such taxes are committed to complete the collection of such taxes with legal interest and costs and pay over the same to the treasurer of the town for which he is the collector.

Upon the annexation to adjacent towns of the territory within the towns of Enfield, Greenwich and Prescott as set forth in this act, the commission or the metropolitan district commission shall yearly in the month of November reimburse each of said adjacent towns for all money paid out or expenses incurred under the laws of the commonwealth for the year preceding in the relief or aid of persons whose settlement was gained in whole or in part whether by original acquisition or derivation within the territory annexed to each of said towns respectively prior to the date of such annexation.

SECTION 15. Annexation under this act shall constitute the annexed territory part of the town and the county to which it is annexed with respect to the jurisdiction of the courts, as well as for all other purposes. All suits, proceedings, complaints and prosecutions, and all matters of probate, which shall be pending at the time of such annexation before any court or trial justice, or such matters as may be incident thereto, may however be heard and determined and prosecuted to final judgment and execution before such court or justice as if said annexation had not taken place; but upon such annexation taking place, the several courts and trial justices having jurisdiction over the respective towns to which the territory within said towns of Enfield, Greenwich and Prescott is annexed shall have jurisdiction of all civil actions, matters of probate and insolvency and criminal prosecutions thereafter begun, although the cause of action has accrued, or crime, offense or misdemeanor has been committed, before such annexation, in the same manner and to the same extent as if such territory had been annexed prior to the accrual of the cause of action or the commission of the crime, offense or misdemeanor.

SECTION 16. An inhabitant of the town of Enfield, Greenwich or Prescott, when annexed to an adjacent town by authority of this act, who remains upon the annexed territory, or who removes to a place within the limits of the town to which the land upon which he resided has been annexed, as such limits existed prior to such annexation, shall have the same right to vote at a town meeting in such town, or at an election of town officers, that he would have had if the annexed territory had constituted a part of said town for six months prior to such meeting or election.

SECTION 17. During any interval between the annexation of said towns of Enfield, Greenwich and Prescott

and the taking possession of the land taken therein by the commission under this act, the commission shall maintain the public ways, public schools and other public works and public institutions in said towns to such extent and in such manner as the commission may deem necessary for the convenience, comfort and welfare of the inhabitants remaining therein.

SECTION 18. No person shall acquire against the commonwealth any rights by prescription or adverse possession in any lands or rights in lands of the commonwealth acquired by the commission under the provisions of this act or of chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six.

SECTION 19. The commission may at any time sell at public or private sale, or exchange or lease any property, real or personal, or any easement or water right including any land in new cemeteries provided for in section nine of this act, whether taken by eminent domain or otherwise acquired, which in the opinion of the commission is no longer needed for the purposes of this act. Any sums of money so received shall be applied by the state treasurer to construction costs or to reduce the bonded indebtedness for the works. The commission, and after said works have been turned over to the metropolitan district commission, the metropolitan district commission, may by lease, license or contract permit the construction and maintenance on or over any land or waters under its control, of towers, poles, wires and other structures for the purpose of transmitting electric power, and may construct, maintain and operate such power plants and other structures as may in its opinion be necessary to utilize the fall of water created at any of the dams, channels, tunnels, or other structures under its control, for the production of power or electricity; may locate, construct and maintain lines for transmitting the same; and may use, sell or contract for the sale or

use of any power or electricity so created, and any sums of money so received shall be applied to reduce the charges of maintenance of the metropolitan water district.

SECTION 20. The provisions of sections six and seven of chapter fifty-nine of the General Laws shall be applicable to land acquired in fee by the commission under this act for reservoir purposes or for the protection of the reservoir except to land within the present limits of the towns of Enfield, Greenwich and Prescott. On the land in these three named towns acquired previous to the date of their annexation, the commission shall pay to each said town in which the respective land is located until such time as the annexation of said town, as provided in section thirteen of this act, a sum in lieu of taxes computed and paid as provided in said sections six and seven of said chapter fifty-nine, but including for this period the buildings and structures thereon. Subsequent to said annexation neither the commission nor the metropolitan district commission shall pay any taxes or make any payments in lieu of taxes on land or buildings within the present limits of the said towns of Enfield, Greenwich and Prescott.

As full compensation for any loss of taxation or any other loss caused by the carrying out of the provisions of this act, the commission shall pay to the county of Hampshire the sum of fifty-five thousand dollars, which sum shall be paid at the time of the annexation of the towns of Enfield, Greenwich and Prescott to adjacent towns.

SECTION 21. Whenever by the provisions of this act the commission is required to make annual payments over a period of years, it may by agreement with the parties interested make a settlement by payment of a liquidated amount, if it deems it advisable so to do.

SECTION 22. Any town or fire or water district on the

water shed of the Swift river may take from this river above any dam constructed under this act across said river so much of the water thereof as it has already been or may hereafter be authorized by the legislature to take for supplying its inhabitants with water, and in case any such town or district shall hereafter on its application therefor be authorized to take such water, the point of connection with and entrance into said river or any pond, reservoir or waters thereof and the location of any pipes, aqueducts, conduits, wells or other water courses laid or constructed on land of the commonwealth shall be determined by agreement between such town or district and the metropolitan district commission, and such town or district shall pay to the commonwealth for the account of the metropolitan water district, all damages to the land, structures or other property of the commonwealth caused by such taking, connection or entrance; and it shall further pay to the commonwealth for the account of the metropolitan water district, a fair proportion of the cost incurred by the commonwealth for the acquisition under the provisions of this act of the waters of said river, or rights therein, and for the construction, maintenance and operation of such works and structures as are authorized by this act, including a fair proportion of the cost of maintaining the purity of said water, the said damages and proportion to be determined by the metropolitan district commission and by such applicant town or district, and, if they cannot agree, such damages and proportion shall be determined by a master to be appointed by the supreme judicial court on petition by the commonwealth or said applicant town or district, and the report of the master, when affirmed by said court, shall be final and conclusive upon all parties.

SECTION 23. No persons shall, after the passage of this act, erect a dam for mill purposes across the Swift river, or any of its tributaries above the village of Bonds-

ville, without the consent in writing of the commission, or, after said works have been turned over to the metropolitan district commission, of said metropolitan district commission. In granting its consent, either commission may impose such conditions as it may deem to be for the public interest. Any person who is constitutionally damaged in his property by the refusal of such consent or by the imposition of such conditions, may recover from the commonwealth the damage so caused in the manner provided in section four of this act.

SECTION 24. The supreme judicial court or any justice thereof and the superior court or any justice thereof, during a sitting of the court or in vacation, on the petition of the commission or of any city, town, corporation or person interested, or of the attorney of any such petitioner, shall have jurisdiction in equity or otherwise to enforce the provisions of this act and of any rule, regulation or order made under the authority of the same and to prevent any violation of said provisions, rules, regulations or order; provided, however, that no suit in which the right of the commission to make any taking authorized by this act is questioned shall be brought except in the supreme judicial court for the county in which said taking has been made or is to be made, nor unless the said suit is brought within six months after the passage of this act.

If any part, subdivision or section of this act shall be declared unconstitutional the validity of its remaining provisions shall not be affected thereby.

SECTION 25. All general laws relating to the water supplies of cities and towns or the lands and other property used for such supplies and the provisions of sections ten to twenty-three, inclusive, of chapter ninety-two of the General Laws shall in so far as they are not inconsistent with the provisions of this act apply to and be observed in carrying out the purposes of this act. The

provisions of chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six shall continue in force except as modified by the provisions of this act, but nothing in this act shall be held to authorize any taking or diversion of the waters of the Ware river in excess of that authorized under the provisions of said chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six.

SECTION 26. Any church or religious society established in the towns of Dana, Enfield, Greenwich, New Salem or Prescott may within five years from the passage of this act file in the probate court or in the supreme judicial court for the county in which such town is located a petition in equity representing that by reason of the construction of the reservoirs and other works contemplated by this act it will be impracticable for such church or religious society thereafter to continue its services of worship or otherwise to carry out the purposes for which it was established and thereupon, after such notice to the attorney general and other persons interested as the court in which such petition is filed may direct, said court may authorize such church or religious society to convey by deed all property real and personal held by it for its own purposes or upon any trust (including the beneficial interest in any trust property held for the benefit of such church or religious society, also any and all contingent rights and interests and any right to damages vested in such church or religious society under the terms of chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six or under the terms of this act) to such appropriate person or corporation as the court may determine, to be held and administered by such person or corporation in such manner and upon such trusts as the court may designate and may further direct that upon the making of such conveyance and upon the filing of a certified copy of the

deed and of the decree authorizing the same in the office of the secretary of the commonwealth such church or religious corporation shall be deemed to be dissolved. If any property conveyed pursuant to a decree entered upon such petition shall thereafter be taken under the provisions of either of said acts, the person or corporation to which such property shall have been so conveyed shall have the same right to damages as such church or religious society would have had if it had not conveyed such property. Before entering a decree as hereinbefore provided, the court shall ascertain whether any rights by way of reverter or otherwise are vested in any person or corporation in any property held by or for the benefit of such church or religious society upon the dissolution of such church or religious society, the discontinuance of its activities, its ceasing to use said property or any other contingency, and, if it shall appear that a conveyance of any such property as hereinbefore provided would be inconsistent with any such rights, the court, if any action appears to be necessary in order to effect a lawful and complete disposition of such property, shall direct that the same be conveyed to the person or corporation found to be entitled thereto in the existing state of things or devise a plan for the application thereof in a manner consistent with such rights. The remedies hereby given shall be in addition to any remedies afforded by existing law.

SECTION 27. For the purpose of carrying out the provisions of this act, the commission may expend such amounts not exceeding in the aggregate fifty million dollars, as may from time to time be approved by the governor and council. To meet such expenditures, the state treasurer shall, from time to time, on the request of the commission and subject to such approval, issue bonds of the commonwealth to an amount not exceeding the sum of fifty million dollars, which shall be a further

addition to the loans authorized by section eight of chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six, and by section six of chapter one hundred and eleven of the acts of nineteen hundred and twenty-seven.

Such bonds shall be issued as coupon or registered bonds, for such term of years as may be recommended by the governor, in accordance with section three of Article LXII of the amendments to the constitution, and shall bear interest at such rate as shall be fixed by the state treasurer, with the approval of the governor and council. The amounts necessary to meet interest and serial payment requirements on said bonds and the expenses of maintaining and operating the works to be constructed by the commission under this act, and such other expenses as may be authorized hereunder, shall be added to the annual assessments upon the cities and towns comprising the metropolitan water district and apportioned and collected as provided by section twenty-six of chapter ninety-two of the General Laws.

Approved April 26, 1927.

APPENDIX B*

THE COMMONWEALTH OF MASSACHUSETTS
METROPOLITAN DISTRICT
WATER SUPPLY COMMISSION

DAVIS R. KENISTON
Chairman
CHARLES M. DAVENPORT
JOSEPH H. SOLIDAY
Commissioners
FRANK E. WINSOR
Chief Engineer

24 SCHOOL STREET, BOSTON

NOVEMBER 30, 1927.

SUBJECT: — WARE RIVER DIVERSION

War Department
United States Engineer Office
13th Floor, Custom House
Boston, Mass.

GENTLEMEN: — The letter from your department, signed by S. A. Cheney, Colonel, Corps of Engineers, District Engineer, dated November 22, 1927, directed to this Commission in reference to the contemplated diversion of the waters of the Swift and Ware Rivers for the purpose of procuring an additional water supply for the Metropolitan District received.

The diversion of waters referred to is of the Ware River authorized by Chapter 375 of the Acts of 1926 (Massachusetts) and of the Swift River authorized by Chapter 321 of the Acts of 1927 (Massachusetts), both rivers being entirely within the State of Massachusetts and being non-navigable. Copies of both of these Acts are attached hereto.

In accordance with the letter from your department

* Inserted by amendment, allowed December 2, 1929.

and as suggested by Colonel Cheney in a recent conference, this Commission hereby makes formal application for a permit for the diversion of the waters of the Ware River in accordance with the terms of Chapter 375 of the Acts of 1926 which provides so far as said diversion is concerned as follows:

SECTION 1, Paragraph 2 — "The commission, on behalf of the commonwealth, shall forthwith for the purpose of extending and increasing the water supply of the metropolitan water system, and of such cities and towns not members of the metropolitan water district as may hereafter require water from said system, divert into the Wachusett reservoir of said district the flood waters, as defined in section four, of the Ware river at a point in the town of Oakham or the town of Barre not more than one mile from the bridge of the Boston and Albany railroad crossing said river in the village of Coldbrook, and construct as a part of the metropolitan water system, such works as may be necessary for such extension and increase, and all structures and appurtenances incidental or complementary thereto; provided, that said flood waters shall not be so diverted between May thirty-first and December first in any year unless such diversion be first approved by the state department of public health."

SECTION 4, Paragraph 1 — "For the purposes of this act, the flood waters of the said Ware river which the commission is authorized to divert as provided in section one are hereby defined to be the waters thereof at and above the point of diversion established under section one in excess of a flow of eighty-five million gallons a day, meaning thereby that on any day when the natural flow of said river is less than eighty-five million gallons no water shall be diverted."

This matter was taken up by Mr. Winsor, Chief Engineer of this Commission, with Major Fowler of the Providence office early in the year, and it was our impression that if anything further was required on the part of the War Department, we would be notified. Work has been going on since that time and in view of the immediate necessity of the Boston Metropolitan District for an additional water supply, and the serious danger of a water shortage unless this work is prosecuted to the earliest possible completion, we cannot too strongly urge that a permit be immediately granted.

Respectfully,

METROPOLITAN DISTRICT WATER
SUPPLY COMMISSION,

By (Sgd) DAVIS B. KENISTON,
Chairman.

Incls:
DBK : CH

Copy

7510 (Mass. Metro. Dist. Water Comm.) 1. Subject: Application for permission to divert water from Ware River, Mass.

6TH IND.

Office, C. of E. March 6, 1928. — To the Secretary of War.

1. The Metropolitan District Water Supply Commission of the State of Massachusetts has made application for permits to divert excess waters from Ware River and the major part of the flow of the Swift River for an additional water supply for the Boston Metropolitan District. The particular application under consideration in this indorsement refers to the excess waters of the Ware River.

2. Both rivers lie wholly within the State of Massachusetts. They rise in the central part of the State, flow in a southerly direction and uniting with the Quaboag River, form the Chicopee River. The latter flows westward to the Connecticut River.

3. Both applications contemplate the transfer from the Connecticut basin of a portion of the waters naturally tributary thereto, and their diversion through a tunnel to another watershed. In the case of the Swift River it is proposed to construct a storage reservoir and a very large proportional diversion is requested. The application for the Swift River requires further detailed study to arrive at a close determination of its effects on the navigable capacity of the Connecticut. These studies have not progressed sufficiently to enable me to state at this time the amount of allowable diversion or exact conditions under which diversion may be possible without adverse effect on the Connecticut. No storage is proposed in the case of the Ware River and no diversion except when the flow is in excess of

85,000,000 gallons per day (about 131 cubic feet per second), with the proviso that no water shall be diverted between May 31 and December 1 in any year unless first approved by the State Department of Public Health. The proposed Swift River diversion presents a complicated question. The Ware River application involves no unusual difficulties.

4. The drainage area of the Swift River above the lower end of the reservoir, is about 186 square miles. The drainage area of the Ware above the proposed point of diversion is about 98 square miles. The drainage area of the Connecticut is about 11,000 square miles.

5. Objections to the proposed diversion have been presented both in writing and orally by representatives of the State of Connecticut, the City of Hartford and the Hartford and New York Transportation Company. The Division Engineer has raised the question of the adverse effect on power development at Enfield Rapids, Conn. The State of Connecticut has instituted an action in the Supreme Court of the United States to restrain the taking of any part of the waters of the Ware, Swift and other rivers, basing its contention only incidentally on adverse effects on navigable capacity of the Connecticut.

6. After a study of the Ware River application had been made, the District Engineer of the Providence District held a public hearing at Springfield, on the 9th ultimo to give the States of Massachusetts and Connecticut and all interested parties opportunity to present their views. At the hearing no attempt was made by either side to controvert the finding set forth in the notice of hearing that the navigable depth of the Connecticut will not be affected by diversion between October 15 and June 15 except to the extent of an average of 0.6 of a day per year. . . .

7. The records of discharge of the Ware River for the years 1913–1926 indicate that a volume of flow in excess of 131 cubic feet per second at the proposed point of diversion did not occur on any day between October 15 and June 15 of those years when the Hartford gauge at 8 a.m. was below 2 feet. The same records indicate that a volume of flow in excess of 131 cubic feet at the proposed point of diversion has occurred only on an average of 0.7 of a day per year when the Hartford gauge at 8 a.m. was below 3 feet. The maximum amount thus capable of diversion occurred on December 15, 1924, when the volume of flow was 170 cubic feet per second and the gauge reading at Hartford was 2.7 feet. The possible amount that could then have been diverted was 39 cubic feet per second. The effect on gauge heights or navigable depths by the diversion of that amount would be imperceptible. These flashy and insignificant occurrences on the Ware are not reflected by the gauge at Hartford as much as are wind and tide effects. . . .

8. . . . In my judgment the use of excess waters from the Ware, as outlined above, will not have any injurious effect on navigation irrespective of any diversion which may be authorized from the Swift. Furthermore a proper regulation of the Swift River by storage of flood waters may be actually beneficial by making possible an increase of flow during dry periods. By careful and economical usage flood stages may be slightly lowered, navigable depth slightly benefited and diversion of reasonable amounts for water supply made feasible.

9. The applicant is very desirous of a decision concerning the Ware River application as soon as possible. So far as the interests committed to this Department are concerned, I see no reason for deferring action in the case. In my opinion the proposed diversion of waters in excess of 85,000,000 gallons per day (131 cubic

feet) will have no adverse effect on the navigable capacity of the Connecticut River. In view of the controversy before the Supreme Court, it seems inadvisable to issue a formal permit for the present but to inform the applicant that no objection will be interposed by the War Department to the diversion of the flood waters exceeding 85,000,000 gallons per day for the period October 15 to June 15, of each year. Approval of this course of action is recommended.

(Signed) EDGAR JADWIN
Major General,
Chief of Engineers.

Approved March 14, 1928.

(Signed) DWIGHT F. DAVIS,
Secretary of War.

WAR DEPARTMENT
UNITED STATES ENGINEER OFFICE
PROVIDENCE, R. I.

Refer to file No. Comm. 64 1-104 MARCH 19, 1928.

Metropolitan District Water Supply Commission, The Commonwealth of Massachusetts, 24 School Street, Boston, Massachusetts.

GENTLEMEN:—Referring to your application of November 30, 1927, for federal authority for the diversion of the flood waters of the Ware River for an additional water supply for the Boston Metropolitan District, this office has been directed by the Chief of Engineers to inform you that no objection will be interposed by the War Department to the diversion of the flood waters of the Ware River exceeding 85,000,000 gallons per day for the period October 16 to June 15 each year.

For and in the absence of Colonel S. A. Cheney, Corps of Engineers, District Engineer.

Very respectfully,

THOS. R. McELROE (Sgd.),
Chief Clerk.

APPENDIX C*

THE COMMONWEALTH OF MASSACHUSETTS
METROPOLITAN DISTRICT
WATER SUPPLY COMMISSION

DAVIS R. KENISTON
Chairman
CHARLES M. DAVENPORT
JOSEPH H. SOLIDAY
Commissioners
FRANK E. WINSOR
Chief Engineer

24 SCHOOL STREET, BOSTON

NOVEMBER 30, 1927.

SUBJECT: — SWIFT RIVER DIVERSION

War Department
United States Engineer Office
12th Floor — Custom House
Boston, Massachusetts

GENTLEMEN: — The letter from your department signed by S. A. Cheney, Colonel, Corps of Engineers, District Engineer, dated November 22, 1927, directed to this Commission in reference to the contemplated diversion of the waters of the Swift and Ware Rivers for the purpose of procuring an additional water supply for the Metropolitan District received.

The diversion of waters referred to is of the Ware River authorized by Chapter 375 of the Acts of 1926 (Massachusetts) and of the Swift River authorized by Chapter 321 of the Acts of 1927 (Massachusetts), both rivers being entirely within the State of Massachusetts and being non-navigable. Copies of both of these Acts are attached hereto.

* Inserted by amendment, allowed December 2, 1929.

In accordance with the letter from your department and as suggested by Colonel Cheney in a recent conference, this Commission hereby makes formal application for a permit for the diversion of the waters of the Swift River in accordance with the terms of Chapter 321 of the Acts of 1927 which provides so far as said diversion is concerned as follows:

SECTION 1, 1st Paragraph — "The metropolitan district water supply commission, established by chapter three hundred and seventy-five of the acts of nineteen hundred and twenty-six, hereinafter referred to as the commission, on behalf of the commonwealth, shall forthwith, for the purpose of adding to, extending and further developing the additional sources of water supply of the metropolitan water system provided for in said chapter three hundred and seventy-five, divert into the Wachusett reservoir of the metropolitan water system the waters of the Swift River, and of Beaver brook, a tributary of the Ware river, by the construction of an extension, to the Swift river, of the aqueduct or tunnel between the Wachusett reservoir and the Ware river at or near Coldbrook provided for in said chapter three hundred and seventy-five, and by the construction of a temporary diversion dam as may be required at a point on the Swift river below the confluence of the east and middle branches or at a point on the east branch near the village of Greenwich, and ultimately by the construction of a dam across the Swift river at or near the boundary line between the towns of Ware and Enfield, and of a dam across Beaver Brook at or near said boundary line, thereby creating a storage reservoir in the Swift river valley. No water shall be diverted or stored in any calendar day when the flow of the Swift river at or just above the village

of Bondsville in the towns of Palmer and Belchertown is less than twenty million gallons; and there shall be discharged from any storage created by the commission above said village a sufficient amount of water to maintain, so far as such storage will allow, a flow of said river at said village of not less than twenty million gallons in each calendar day."

This matter was taken up by Mr. Winsor, Chief Engineer of this Commission, with Major Fowler of the Providence office early in the year, and it was our impression that if anything further was required on the part of the War Department, we would be notified. Work has been going on since that time and in view of the immediate necessity of the Boston Metropolitan District for an additional water supply, and the serious danger of a water shortage unless this work is prosecuted to the earliest possible completion, we cannot too strongly urge that a permit be immediately granted.

Respectfully,

METROPOLITAN DISTRICT WATER SUPPLY COMMISSION,

By (sgd) DAVIS B. KENISTON,
Chairman.

Encls.
DKB: CH (Pw)

THE COMMONWEALTH OF MASSACHUSETTS
METROPOLITAN DISTRICT
WATER SUPPLY COMMISSION

DAVIS R. KENISTON
Chairman
CHARLES M. DAVENPORT
JOSEPH H. SOLLIVAN
Commissioners
FRANK E. WINSOR
Chief Engineer

24 SCHOOL STREET, BOSTON

NOVEMBER 30, 1927

SUBJECT: — WARE AND SWIFT RIVER DIVERSIONS

War Department
United States Engineer Office
13th Floor, Custom House
Boston, Massachusetts

GENTLEMEN: — Supplementing the applications of November 30 from this Commission to the War Department for permits for the Swift and Ware River diversions, your attention is directed to the correspondence now in your files between Major R. E. Fowler, Corps of Engineers, District Engineer at Providence, and Frank E. Winsor, Chief Engineer of this Commission, covering the period from January 25 to March 9, 1927. This Commission inferred from this correspondence that the War department had taken or would take the view that the proposed diversion from the Ware River would be no detriment to the navigable depth of the Connecticut River and that the proposed diversion from the Swift River would not be objected to unless or until the War Department, after taking into account various other factors influencing the flow of the Connecticut, such as storage held and released by mills, power companies, etc. in ponds and storage reservoirs, should demonstrate that

such diversion would reduce the navigable depth, in which case the War Department might require greater quantities to be released from time to time during the dry season.

The diversion of both the Swift and Ware Rivers is essentially one project so far as a practical and economical development of an additional water supply for the Boston Metropolitan District is concerned.

The Ware River diversion in effect skims off the flow as it occurs in excess of 85,000,000 gallons, which is equivalent to 1.34 cubic feet per second per square mile from the approximate 98 square miles of drainage area affected (prior to a recent survey this area was assumed to be about 100 square miles). This flow of 1.34 cubic feet per second unaffected by the diversion is several times the average dry weather flow of the Ware River.

The Swift River diversion is from about 186 square miles and there is guaranteed a flow in the Swift River at Bondsville, about five miles below the proposed Swift River Reservoir, of 20,000,000 gallons a day, the drainage area at Bondsville being about 195 square miles. The guaranteed flow is 0.16 cubic feet per second per square mile. The drainage area of 186 square miles is 1.71% of the drainage area of the Connecticut River of 11,400 square miles and from this 186 square miles sufficient water is released to insure a flow of 0.16 cubic feet per second per square mile from 195 square miles of drainage area. There will be no reduction but a slight increase in the flow of the Swift River in the driest times and during the usual dry season the average reduction in flow of the Connecticut River will correspond to a reduction of drainage area of that river not greater than one per cent. The effect on the flow of the Connecticut River of so small a diversion will, it is believed, be immeasurable so far as reducing the navigable depth is concerned.

During the past year the Commission has expended a

large amount of money on the Ware and Swift River projects, including the cost of sinking of shafts preparatory to the construction of the tunnel which is necessary for making available the flood waters of the Ware River. Satisfactory bids for the construction of the tunnel itself were received on November 18. This contract if awarded in the immediate future and if completed in the time specified will permit the diversion of Ware River water into the Wachusett Reservoir in the winter or spring of 1931, before which time no water can be diverted. To suspend operations at this time would not only involve the Commonwealth in a heavy financial loss, but would also delay procuring the additional supply of water badly needed by the Metropolitan District at the earliest possible date.

The Swift River diversion cannot be begun until the tunnel is extended from the Ware River to the Swift River and it is estimated that the earliest time at which water could be diverted from the Swift River would be during 1933.

There is inclosed herewith preliminary blueprint of plan, Accession 617, being a general plan of the Metropolitan Water Supply.

Respectfully,

METROPOLITAN DISTRICT WATER
SUPPLY COMMISSION,

By (Sgd) DAVIS B. KENISTON,
Chairman.

FEW : AW
Inclosure

COPY

7510 (Mass. Metro. Dist. Water Supply Com.) 2. Subject: Swift River Diversion.

7TH IND.

Office, C. of E., May 9, 1929. — To the Secretary of War.

1. On November 30, 1927, the Metropolitan District Water Supply Commission of Boston, at the written suggestion of the District Engineer, Providence District, made a formal application for a permit to divert water from the Swift River, Massachusetts, in accordance with the terms of Chapter 321 of the Acts of 1923 of that State. On the same date, the Commission also made application for a permit to divert water from the Ware River, Massachusetts, in accordance with the terms of Chapter 375 of the State Acts of 1926.

2. Those rivers rise in the central region of Massachusetts and flow southerly and westerly to a junction forming the Chicopee River which flows westerly and empties into the Connecticut at a point about 9.5 miles north of the boundary between Massachusetts and Connecticut.

3. On March 14, 1928, the Secretary of War approved a recommendation of the Chief of Engineers that the applicant be informed that no objection would be interposed by the War Department to the diversion from the Ware River of the flood waters exceeding 85,000,000 gallons per day for the period October 15 to June 15, of each year. This approval was given by the Secretary of War with the understanding that such action would not affect the consideration of the Swift River application.

4. The Swift River application contemplates the storage of its flow and its possible diversion with the exception of 20,000,000 gallons of water per day into the Wachusett Reservoir, situated about 30 miles eastward of the point of diversion and in another watershed.

Storage would be provided first by a temporary dam to be constructed below the confluence of the east and middle branches of the Swift River or at a point on the east branch near the village of Greenwich, and ultimately by the construction of a dam across the Swift River at or near the boundary of Ware and Enfield, and of a dam across Beaver Brook at or near said boundary line.

5. No permit is required for any of the diversion structures as the Swift River and its various branches, as well as Beaver Brook, are non-navigable streams. The jurisdiction of the War Department in cases of this kind begins when the appropriation or regulation of the waters of a non-navigable tributary is of such extent as "to alter or modify the . . . condition or capacity of . . . the channel of any navigable water of the United States". Since such alteration or modification without previous recommendation and authorization of the Chief of Engineers and the Secretary of War is unlawful, the War Department is interested in determining whether the amount of such appropriation or regulation would probably demand institution of Federal proceedings to preserve substantially the navigability of navigable waters.

6. This particular case has been studied in great detail during the past 17 months by the District Engineer at Providence, the Division Engineer at New York and the Office of the Chief of Engineers. Full opportunity has been given to the representatives of the Metropolitan District Water Supply Commission and of the State of Connecticut and other interested parties, to present data and to inform themselves of the progress of these studies.

7. The State of Connecticut presented objections based on both legal and engineering grounds. All such legal questions have been answered so far as concerns the interests entrusted to the Department. No attempt has been made to answer the fundamental questions of law involved as to the right to divert water from one

watershed to another, inasmuch as the State of Connecticut has instituted an action in the Supreme Court of the United States to restrain the taking of any part of the water of the Ware, Swift and other rivers. It is believed that the decision of such issues should be left to that tribunal. The objections which have been raised on engineering or navigation grounds are referred to later in this indorsement.

8. The watershed of the Connecticut River above the Massachusetts-Connecticut boundary is 9,915 square miles. The drainage area of the Swift River involved in this application is approximately 186 square miles. The mean annual discharge of the Connecticut River at the State Line is about 17,000 cubic feet per second and the mean annual discharge of the Swift River at the proposed dam site, about 300 cubic feet per second. The discharges of both rivers are affected and regulated to a considerable extent by mill and power dams which temporarily store water to suit occupational uses. The stage of the river at Hartford is indicated by a gauge at that point. The surface elevations are affected by tide and wind. The best information of normal flow conditions of the Connecticut River is afforded by the records of the United States Geological Survey gauge at Sunderland, Massachusetts, located on that river about as far above Hartford as the site of the proposed dam on the Swift River. Study of the gauge records indicate that critical stages normally occur between June 15 and November 15. The critical period for navigation is taken as from June 1 to November 30.

9. The legislation of the State of Massachusetts prescribes that there shall be maintained a minimum flow of water of 31 cubic feet per second at Bondsville at a gauge located on the Swift River below the site of the proposed impounding dam, and where the tributary drainage area is 8 square miles in excess of that above that dam.

10. The results of the studies made by and under the direction of this office were submitted for comment to the representatives of the Metropolitan Water Supply District of Boston and to the representatives of the State of Connecticut. Both groups were in this office many times in discussions and conferences on both the legal phases and the navigation features of the case. In general, the representatives of Massachusetts indicated originally the opinion that the Office of the Chief of Engineers was magnifying the effect on navigation of the proposed appropriation of water in excess of 31 cubic feet per second. They stressed the desirability of early action by the Department to define the limits beyond which Massachusetts could not appropriate water without violating the provisions of the River and Harbor Act of March 3, 1899. On the other hand, the representatives of the State of Connecticut claimed that the proposals of the Department would not assure a 2-foot stage on the Hartford gauge; furthermore, that the maintenance of a 3-foot gauge rather than a 2-foot gauge was a better measure of the navigable capacity of the Connecticut River. Principally, however, the representatives of Connecticut strongly urged against any action positive or negative or inferential which permitted or which would permit or acquiesce to any degree in any diversion from the watershed of the Connecticut River to any other watershed.

11. The applicant is very desirous of obtaining a definite statement as to the limits of appropriation of water from the non-navigable Swift River which may be possible without substantially altering the condition or capacity or the channel of the navigable Connecticut River. In addition to the exhaustive study of the engineering data pertinent to the interests committed to the War Department, this office has taken into consideration the possible bearing upon Department action in this matter of the decisions of the Supreme Court in

the cases of the United States *vs.* Rio Grande Dam Irrigation Company and of the State of Wisconsin and other states *vs.* the State of Illinois and Sanitary District of Chicago, both of which involve questions regarding diversions affecting navigable waters. In the action hereinafter suggested, it is felt that the proposed position of the War Department will in no way prejudice the litigation now pending before the Supreme Court.

It is recommended that the applicant be informed as follows:

(a) It is the duty of the War Department to institute proceedings to preserve the substantial navigability of navigable waters of the United States when the appropriation or regulation of the waters of a non-navigable tributary affects, substantially alters or modifies the condition or capacity of the channel of a navigable water.

(b) The War Department is unwilling to admit that the appropriation of water from the Swift River to the extent proposed in this application might not, on occasion, have an appreciable effect on the navigable capacity of the Connecticut River.

(c) Limited amounts of water may be appropriated from the Connecticut River basin above the Connecticut-Massachusetts State Line, without substantially diminishing the navigability of that stream within the limits of present navigability.

(d) It is found that a discharge of 4,900 cubic feet per second at Sunderland, Massachusetts, corresponds to average lower low tide gauge height of 2.1 at Hartford, Connecticut and that a discharge of 4,650 cubic feet per second at Sunderland corresponds to an average lower low tide gauge height of 2.0 at Hartford.

(e) From the studies of past records it appears there will be no substantial alteration or modification of the condition or navigable capacity of the channel of the navigable portion of the Connecticut River if

the flow of water from the Swift River as provided in the terms of Chapter 321, of the Acts of 1927 (Massachusetts) be augmented during the critical period from June 1 to November 30, both inclusive, so that the measured rate of discharge on the Swift River shall be 70 cubic feet per second on such days as the United States Geological Survey gauge at Sunderland, Massachusetts indicates the discharge of the Connecticut River at that point to be less than 4900 cubic feet per second and more than 4650 cubic feet per second and shall be further augmented so that the measured rate of discharge past the impounding dam on the Swift River shall be 110 cubic feet per second on such days as the Geological Survey gauge at Sunderland Massachusetts indicates the discharge on the Connecticut River at that point to be 4650 cubic feet per second or less.

(f) The rates of discharge set forth in subparagraph (e) are subject to review based on more complete data which may become available in the future.

12. Approval of this course of action is recommended.

[M. & R. DIV.
May 10, 1929
Off. Sec. War]

(s) EDGAR JADWIN

EDGAR JADWIN,
Major General,
Chief of Engineers.

1 Inclo. viz;
Map showing proposed
plan of diversion.

Recommendation of 7th indorsement approved May 11, 1929.

[M & R Div.
May 11, 1929
Off. Sec. War]

(s) JAMES W. GOOD,
Secretary of War.

Sub. 2/6 accpg.

MAY 11, 1929.

COPY

Address Reply to
THE DISTRICT ENGINEER
Room 419, New Federal Building
Providence, R. I.

WAR DEPARTMENT
UNITED STATES ENGINEER OFFICE
Providence, R. I.

MAY 17, 1929.

Refer to File No. Conn. 54/1–166

Metropolitan District Water Supply Commission, 24 School Street, Boston, Mass.

GENTLEMEN: — With reference to your application of November 30, 1927 for a permit to divert water from the Swift River, Massachusetts, in accordance with the terms of Chapter 321 of the Acts of 1927 of that State, I have been directed by the Chief of Engineers under date of May 13 to inform you as follows:

(a) It is the duty of the War Department to institute proceedings to preserve the substantial navigability of navigable waters of the United States when the appropriation or regulation of the waters of a non-navigable tributary affects, substantially alters or modifies the condition or capacity of the channel of a navigable water.

(b) The War Department is unwilling to admit that the appropriation of water from the Swift River to the extent proposed in this application might not, on occasion, have an appreciable effect on the navigable capacity of the Connecticut River.

(c) Limited amounts of water may be appropriated from the Connecticut River basin above the Connecticut–Massachusetts State Line, without substantially diminishing the navigability of that stream within the limits of present navigability.

(d) It is found that a discharge of 4900 cubic feet per second at Sunderland, Massachusetts, corresponds to average lower low tide gauge height of 2.1 at Hartford, Connecticut and that a discharge of 4650 cubic feet per second at Sunderland corresponds to an average lower low tide gauge height of 2.0 at Hartford.

(e) From the studies of past records it appears there will be no substantial alteration or modification of the condition or navigable capacity of the channel of the navigable portion of the Connecticut River if the flow of water from the Swift River as provided in the terms of Chapter 321, of the Acts of 1927 (Massachusetts) be augmented during the critical period from June 1 to November 30, both inclusive, so that the measured rate of discharge on the Swift River shall be 70 cubic feet per second on such days as the United States Geological Survey gauge at Sunderland, Massachusetts indicates the discharge of the Connecticut River at that point to be less than 4900 cubic feet per second and more than 4650 cubic feet per second and shall be further augmented so that the measured rate of discharge past the impounding dam on the Swift River shall be 110 cubic feet per second on such days as the Geological Survey gauge at Sunderland, Massachusetts indicates the discharge on the Connecticut River at that point to be 4650 cubic feet per second or less.

(f) The rates of discharge set forth in subparagraph (e) are subject to review based on more complete data which may become available in the future.

Very respectfully,

(Signed) F. S. SKINNER
Major, Corps of Engineers,
District Engineer.

FILE COPY

Office Supreme
FILED
APR 1
CHARLES

In the Supreme Court of the United States.

OCTOBER TERM, 1928.

No. 13, ORIGINAL.

THE STATE OF CONNECTICUT,
COMPLAINANT,

v.

THE COMMONWEALTH OF MASSACHUSETTS,
DEFENDANT.

BRIEF OF THE DEFENDANT, THE COMMONWEALTH OF MASSACHUSETTS, IN OPPOSITION TO THE MOTION OF THE COMPLAINANT TO JOIN THE SECRETARY OF WAR AND THE CHIEF OF ENGINEERS, UNITED STATES ARMY, AS PARTIES RESPONDENT.

JOSEPH E. WARNER, *Attorney General of the Commonwealth of Massachusetts.*

BENTLEY W. WARREN, *Special Assistant Attorney General of the Commonwealth of Massachusetts.*

GERALD J. CALLAHAN, *Assistant Attorney General of the Commonwealth of Massachusetts.*

R. AMMI CUTTER, *Assistant Attorney General of the Commonwealth of Massachusetts.*

ADDISON C. GUILCHELL & SON, LAW PRINTERS, BOSTON.

SUBJECT INDEX.

	Page
Concise statement of the case	1
Summary of the contentions of the Commonwealth of Massachusetts in opposition to the allowance of the pending motion	4
Points and authorities (for detailed statement, see summary of argument, pp. 4 to 6)	7
Conclusion	36

TABLE OF CASES CITED.

Florida v. Mellon, 273 U.S. 12	19, 29, 33, 35
Kansas v. Colorado, 185 U.S. 125	21
Louisville Bridge Co. v. United States, 242 U.S. 409	19, 25, 29
Massachusetts v. Mellon, 262 U.S. 447	29, 30, 33, 34, 35
Miller v. Mayor, 109 U.S. 385	25
Missouri v. Holland, 252 U.S. 416	30, 31, 34
Monongahela Bridge Co. v. United States, 216 U.S. 177	25
New Jersey v. Sargent, 269 U.S. 328	29, 33
New York v. Illinois & Sanitary District, 274 U.S. 488	19, 33
Pennsylvania v. Wheeling Bridge Co., 18 How. 421	25
Philadelphia Co. v. Stimson, 223 U.S. 605	25, 29
Port of Seattle v. Oregon &c. R. Co., 255 U.S. 56	23
Sanitary District of Chicago v. United States, 266 U.S. 405	15, 17, 32
South Carolina v. Georgia, 93 U.S. 4	25
Southern Pacific Co. v. Olympian Dredging Co., 260 U.S. 205	25, 29
United States v. Chandler-Dunbar Co., 229 U.S. 53	23, 25
United States v. Rio Grande &c. Co., 174 U.S. 690	13
United States v. River Rouge Improvement Co., 269 U.S. 411	33
Wisconsin v. Illinois and Sanitary District, Nos. 7, 11, 12 Original, October term, 1928, decided January 14, 1929	8, 9, 11, 13, 14, 15, 16, 17, 21, 22, 23, 31

TABLE OF AUTHORITIES CITED.

	Page
Act of March 3, 1899 (see 30 Stat. at L. 1151)	4, 7, 25, 26
Mass. Stat. 1926, c. 375	2, 18
Mass. Stat. 1927, c. 321	2
34 Op. (U.S.) Atty. Gen. 410	10, 13
Special Master's Report, Wisconsin v. Illinois	14, 15, 22
30 Stat. at L. 1151, § 9	7
30 Stat. at L. 1151, § 10	7
30 Stat. at L. 1151, 1153, § 18	25
U.S. Code, Tit. 33, § 401	7
U.S. Code, Tit. 33, § 403	7
U.S. Code, Tit. 33, § 502	25
U.S. Const., art. I, § 8, cl. 3	23

In the Supreme Court of the United States.

OCTOBER TERM, 1928.

No. 13, ORIGINAL.

THE STATE OF CONNECTICUT,

COMPLAINANT,

v.

THE COMMONWEALTH OF MASSACHUSETTS,

DEFENDANT.

BRIEF OF THE DEFENDANT, THE COMMONWEALTH OF MASSACHUSETTS, IN OPPOSITION TO THE MOTION OF THE COMPLAINANT TO JOIN THE SECRETARY OF WAR AND THE CHIEF OF ENGINEERS, UNITED STATES ARMY, AS PARTIES RESPONDENT.

CONCISE STATEMENT OF THE CASE.

The principal case is an original bill in equity filed by leave of court by the complainant, the State of Connecticut, seeking to prevent and enjoin the defendant, the Commonwealth of Massachusetts, from diverting—

(*a*) the flood waters of the Ware river,
(*b*) certain waters of the Swift river,

both of which streams are non-navigable tributaries of the Connecticut river and are situated wholly within the geographical limits of Massachusetts. The purpose of the proposed diversion, authorized by two acts of the General Court

of Massachusetts (Answer, pp. 33 to 77), is to provide a suitable supply of water for drinking and domestic use for the Metropolitan Area surrounding the City of Boston, which is now threatened with a serious water shortage (Answer, pp. 23-24). The Massachusetts legislation authorizing the project is found in Acts of 1926, c. 375, and Acts of 1927, c. 321.

Connecticut, appearing not only as a proprietor of riparian lands (Bill, p. 6), but also as *parens patriae* (Bill, pp. 2, 6, 10, 13), alleges that the diversion will seriously impair navigation upon the Connecticut river (Bill, p. 10), that it will diminish the flow of water in the river sufficiently to cause damage to the health (Bill, pp. 8, 9, 11, 12), welfare, and property interests of Connecticut and her citizens, and that it will be a violation of the riparian rights (Bill, p. 7) of the State of Connecticut and of the citizens of that State, who can be represented as against another sovereign State of the Union only by the State as *parens patriae*.

Massachusetts in an answer to the bill, filed by leave of court, denies that any injury to navigation, to the State of Connecticut, or to the citizens of that State will result from the proposed diversion, and affirmatively alleges that compared to the total flow in the Connecticut river at the Connecticut–Massachusetts boundary the flow to be diverted is negligible and insignificant (Answer, pp. 1-27). [It appears from the bill (p. 4) that the total watershed of the Connecticut river is 11,300 square miles. The watershed of the Ware river is alleged to be 221 square miles and that of the Swift river is set forth as 213 square miles (Bill, p. 5).] Massachusetts also sets up certain affirmative legal and equitable defenses (Answer, pp. 27-32), including—

(*a*) The existence of an emergency within Massachusetts constituting a justification for a reasonable use of the waters to be taken by the proposed diversion (Answer, pp. 27-28).

(*b*) The existence of an adequate remedy at law in the State of Connecticut and its citizens for compensation by

way of money damages for any incidental injury caused to the State or its citizens (Answer, pp. 24-25, 28-29).

(*c*) The serious injury to the welfare of the citizens of Massachusetts, if the diversion is prohibited, compared to the negligible and trivial damage to Connecticut and its citizens possibly caused if the diversion is permitted, which should lead a court of equity to give substitutional relief rather than specific relief.

(*d*) The contention that the claim of Connecticut goes beyond a claim in behalf of the State in its true capacity as *parens patriae*.

(*e*) The contention that, so far as relief is sought for interference with navigation, the matter is one delegated under due constitutional authority by the Congress of the United States to the Secretary of War and his subordinates.

(*f*) The contention that the diversion is one which is *de minimis* and in all respects a reasonable use of the waters of the Swift and Ware rivers by Massachusetts.

(*g*) Laches.

Connecticut now seeks leave to file a motion (of which printed copies were not available to counsel at the time of the preparation of this brief) which is substantially a supplementary bill, requesting that the Secretary of War and the Chief of Engineers be joined as parties defendant and that they be enjoined from giving their official approval to the project contemplated by Massachusetts. The approval of the War Department has been sought by Massachusetts through the filing of formal applications for a permit to make the proposed diversions (Motion, par. 3). It appears from the motion that, within the limits approved by the War Department officials, they have determined (Motion, par. 12) or are about to determine (Motion, par. 32) that both the proposed diversions will have no adverse effect upon the navigability or the navigable capacity of the Connecticut river. This determination, so far as appears from this

record, is made in good faith after investigation (Motion, pars. 5, 11, 12, 14, 15, 16, 30) and hearing and after affording Connecticut opportunity to present argument and engineering data, including everything contained in the pending motion (Motion, par. 30). It appears from the motion that the War Department has been considering the application for approval of the Swift diversion since December 6, 1927 (Motion, par. 3).

The motion alleges in general terms, however, that all the evidence before the Secretary of War and the Chief of Engineers should have led those officials to decide that the proposed diversions would constitute an obstruction to navigation (Motion, pars. 9, 10, 11, 12, 14, 15, 16). No substantive facts are set out in the motion from which it can be determined (if the decision of the War Department officials is reviewable at all) whether the Secretary of War was correct in his decision.

Massachusetts now opposes the granting of leave to Connecticut to file the proposed motion and is prepared to oppose the granting of the motion upon its merits.

SUMMARY OF THE CONTENTIONS OF THE COMMONWEALTH OF MASSACHUSETTS IN OPPOSITION TO THE ALLOWANCE OF THE PENDING MOTION.

The Commonwealth of Massachusetts opposes the allowance of the motion presented by the State of Connecticut upon the following grounds:

I. The action of the Secretary of War and of the Chief of Engineers in approving the proposed diversions from the Ware river and the Swift river so far as concerns the Federal interest in navigation constitutes a proper exercise of the authority and duty confided to those officials under the provisions of section 10 of the Act of March 3, 1899. Under that act the duty of determining whether in any

given instance a proposed diversion of water from non-navigable streams, tributary to a navigable water, will be an unreasonable obstruction to navigation or to the navigable capacity of such navigable water devolves upon those officials (see *infra*, pp. 7 to 27).

A. Congress by the first clause of section 10 has prohibited all unreasonable obstructions of the capacity of navigable waters unless they are affirmatively authorized by Congress. The consent of Congress itself (by special statute) must be obtained in order that the types of projects mentioned in section 9 may be permitted. As to projects such as those now contemplated by Massachusetts, which are clearly included within the provisions of the second and third clauses of section 10, Congress by a valid delegation of power has made it the duty of the Secretary of War, upon recommendation of the Chief of Engineers, to determine whether the project shall be approved either because it is an affirmative aid to navigation or because it is in no sense an unreasonable obstruction to navigable capacity (*infra*, pp. 7 to 17).

B. The determination which the Secretary of War and the Chief of Engineers are required to make with respect to the proposed diversions by Massachusetts is purely a determination of the issue of fact committed to them by section 10, of whether the diversions will in fact cause an unreasonable diminution of the navigable capacity of the navigable portions of the Connecticut river. There are no allegations in the Connecticut motion which show or set up any failure on the part of the War Department officials either to act with complete good faith or in compliance with all procedural requirement applicable to the questions pending before them (*infra*, pp. 17 to 20).

C. A determination of an issue of fact within the terms of section 10 made by the Secretary of War and the Chief

of Engineers in good faith and in compliance with all pertinent statutory provisions is final. This Honorable Court will not review such a determination directly, thereby substituting its judgment for that of the War Department, nor will this Court enjoin the War Department officials from performing their duty (*infra*, pp. 20 to 27).

II. No controversy capable of judicial determination exists between the State of Connecticut and the Secretary of War and the Chief of Engineers (see *infra*, pp. 27 to 35).

A. A sovereign State in its proprietary capacity has no standing to enjoin the performance by officers of the United States of duties committed to them by an act of Congress, which is valid and constitutional, unless some property right of the State is immediately and directly threatened by the act of the Federal officials. Inasmuch as the allegations of the pending motion reveal no immediately threatened injury to any property interest of the State of Connecticut by the action of the officials of the War Department in making the determination required of them by statute, Connecticut has no standing to maintain an original bill in this Court against those officials (*infra*, pp. 28 to 35), for that State can obtain complete redress, so far as it is entitled to any relief, by a decree running against Massachusetts.

B. A sovereign State cannot as *parens patriae*, representing the general welfare of its citizens, maintain an original bill in equity to enjoin the action of Federal officers acting in purported compliance with duties imposed upon them by valid acts of Congress (*infra*, p. 35).

POINTS AND AUTHORITIES.

I.

THE ACTION OF THE SECRETARY OF WAR AND THE CHIEF OF ENGINEERS UPON THE APPLICATION FOR APPROVAL OF THE DIVERSION OF THE FLOOD WATERS OF THE WARE RIVER AND THEIR PROPOSED ACTION UPON THE APPLICATION FOR APPROVAL OF THE DIVERSION OF CERTAIN WATERS OF THE SWIFT RIVER CONSTITUTE A PROPER PERFORMANCE OF THE DUTIES DELEGATED TO THEM BY THE ACT OF CONGRESS OF MARCH 3, 1899.

A. The Duty of Determining whether Any Given Diversion of Water, which if Not Diverted will Flow into a Navigable Stream, will Constitute or Cause an Obstruction of the Navigable Capacity of that Stream Devolves upon the Secretary of War and the Chief of Engineers under the Act of March 3, 1899.

Sections 9 and 10 of the Act of March 3, 1899, 30 STAT. AT L. 1151 (U.S. Code, Tit. 33, §§ 401, 403), read as follows:

> "SEC. 9. That it shall not be lawful to construct or commence the construction of any bridge, dam, dike, or causeway over or in any port, roadstead, haven, harbor, canal, navigable river, or other navigable water of the United States until the consent of Congress to the building of such structures shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of War; *Provided,* That such structures may be built under authority of the legislature of a State across rivers and other waterways the navigable portions of which lie wholly within the limits of a single State, provided the location and plans thereof are submitted to and approved by the Chief of Engineers and by the Secretary of War before construction

is commenced: *And provided further*, That when plans for any bridge or other structure have been approved by the Chief of Engineers and by the Secretary of War, it shall not be lawful to deviate from such plans either before or after completion of the structure unless the modification of said plans has previously been submitted to and received the approval of the Chief of Engineers and of the Secretary of War.

"SEC. 10. That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner *to alter or modify the* course, location, condition, or *capacity of*, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, *or of the channel of any navigable water of the United States*, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same." (Italics ours.)

The precise nature of the authority and duty delegated by Congress in these sections was recently considered by this Honorable Court in—

> *Wisconsin* v. *Illinois and Sanitary District;* Nos. 7, 11, 12 Original, October term, 1928, decided January 14, 1929.

At pages 12-13 of the Official Advance Sheets appears the following language:

> "The policy carried out in the Act of March 3, 1899, had been begun in the Act of September 19, 1890, c. 907; 26 Stat. 454, 455. Sections 9 and 10 were the rearranged result of the provisions of Sections 7 and 10 of the Act of 1890. A new classification was made in Sections 9 and 10 of the Act of 1899, and substituted for Section 10 of the Act of 1890. The latter provided that the creation of any obstruction to navigable capacity was prohibited, unless 'affirmatively authorized by law' and this was changed so as to read 'affirmatively authorized by Congress.' The change in the words of the first clause of Section 10 was intended to make mere State authorization inadequate. *Sanitary District* v. *United States*, 266 U. S. 405, 429; *United States* v. *Bellingham Bay Boom Co.*, 176 U. S. 211. It was not intended to override the authority of the State to put its veto upon the placing of obstructing structures in navigable waters within a State and both State and Federal approval were made necessary in such case. *Cummings* v. *Chicago*, 188 U. S. 410. The words 'affirmatively authorized by Congress' should be construed in the light of the administrative exigencies which prompted the delegation of authority in the succeeding clauses. Congress, having stated in Section 9 as to what particular structures its specific consent should be required, intended to leave to the Secretary of War, acting on the recommendation of the Chief of Engineers, the determination of what should be approved and authorized in the classes of cases described in the second and third clauses of Section 10. If the section were construed to require a special authorization by Congress whenever in any aspect it might be considered that there was an obstruction to navigable capac-

ity, none of the undertakings specifically provided for in the second and third clauses of Section 10 could safely be undertaken without a special authorization of Congress. *We do not think this was intended.* [Italics ours.] The Supreme Court of Maine in *Maine Water Co.* v. *Knickerbocker Steam Towage Co.*, 99 Me. 473, took the same general view in construction of the same section. It held that the broad words of the first clause of that section were not intended to limit the second and third clauses and that Congress's purpose was a direct prohibition of what was forbidden by them except when affirmatively approved by the Chief of Engineers and the Secretary of War. We concur in this view.

"The true intent of the Act of Congress was that unreasonable obstructions to navigation and navigable capacity were to be prohibited, and in the cases described in the second and third clauses of Section 10, the Secretary of War, acting on the recommendation of the Chief of Engineers, was authorized to determine what in the particular cases constituted an unreasonable obstruction."

The court (at p. 13) then adverts to and approves the contemporary construction of section 10 by the War Department, especially as revealed by the Opinion of the Acting Attorney General to the Secretary of War (February 13, 1925), 34 Op. Atty. Gen. 410, 416, where the Acting Attorney General says:

"In my opinion Congress thus intended to delegate to the Chief of Engineers and the Secretary of War an administrative authority to determine a fact; and if they were of opinion that the use of navigable waters in a certain case was not such an impairment of their navigability as to require the prohibition of Congress,

then the construction was 'affirmatively authorized by Congress,' because the administrative agency to which Congress had delegated the ascertainment of the facts had found the fact to be that such use was not for the time being an impairment of navigable capacity such as Congress intended to prohibit.

"I am informed that for a long period of years it has been the practice of the War Department to issue permits under section 10 of the Act of March 3, 1899, without requiring that the particular project be first authorized by special Act of Congress, and that was the policy of the War Department in the specific case of the Sanitary District of Chicago."

The following language of the opinion in *Wisconsin* v. *Illinois and Sanitary District* shows that the court clearly had in mind the precise nature of the determination of fact thus left by Congress to the Secretary of War and to the Chief of Engineers (at pp. 13-14):

"But it is said the construction thus favored would constitute it a delegation by Congress of legislative power and invalid. We do not think so. The determination of the amount that could be safely taken from the Lake is one that is shown by the evidence to be a peculiarly expert question. It is such a question as this that is naturally within the executive function that can be deputed by Congress. . . .

"The construction of Section 10 of the Act of March 3, 1899, was settled by this Court in the decision of the first Chicago Drainage Canal case in 266 U. S. 405, 429. The decision there reached and the decree entered can not be sustained, except on the theory that the Court decided first that Congress had exercised the power to prevent injury to the navigability of Lake Michigan and the other lakes and rivers in the Great Lakes watershed, and second that it could properly and valid-

> ly confer the administrative function of passing on the issue of unlawful injury or otherwise on the Secretary of War, and that it had done so."

Such is this Court's most recent construction of the power and duty confided to the Secretary of War and to the Chief of Engineers by section 10. Briefly, it may be summarized:

1. Congress, by section 10, has declared its decision that no unreasonable obstruction to navigable capacity shall be permitted unless Congress has affirmatively authorized it.

2. Actual assent by Congress itself is necessary to projects covered by section 9. [In the case at bar it appears from the answer (p. 18) that the only dam or other storage reservoir to be constructed by Massachusetts as part of the project will be in the valley of the Swift river, which is in no sense a navigable water of the United States. The Connecticut river itself is not alleged to be navigable above Springfield (Bill, par. 8, p. 4). There is obviously no necessity of action by Congress itself under section 9 in order that approval of the erection of a reservoir in the valley of the Swift river may be obtained.]

3. Congress, by section 10, has delegated to the Secretary of War and to the Chief of Engineers the duty of determining whether any other project (having the necessary or probable result of doing one of the acts mentioned in the second and third clauses of section 10) is reasonable or unreasonable so far as concerns the public interest in the maintenance of navigation for the protection of interstate and foreign commerce. A determination that a project is reasonable constitutes an affirmative authorization by Congress.

[We submit that it cannot successfully be maintained that the authority given by the second and third clauses of section 10 to the Secretary of War and to the Chief of Engineers does not include the power to determine the propriety of diversions from non-navigable tributaries of navigable

waters. The third clause of section 10 (see *supra*, p. 8) reads, in part:

> ["And it shall not be lawful . . . in any manner to alter or modify the . . . capacity . . . of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

[These words are broad and inclusive in meaning and they have been liberally construed to include affecting by diversions the navigable capacity of a navigable water, as in the *Chicago Drainage Canal* cases. (See 34 Op. Atty. Gen. 410, 416.) It is obvious that a diversion from a nonnavigable tributary of a navigable water may have fully as great an effect upon the navigable capacity of that water as a direct diversion from that water itself.

> [*United States* v. *Rio Grande &c. Co.*, 174 U.S. 690, 708.

[The purpose of Congress in making the prohibition contained in the first clause of section 10 would require the Secretary's authorization not only of a direct diversion from a navigable water but of an indirect diversion as well.]

The case of *Wisconsin* v. *Illinois* further defines the standards under which the Secretary and the Chief of Engineers must act in granting or withholding approval under section 10. We contend that these standards may be summarized so far as they affect diversions of water which otherwise would augment navigable waters.

(*a*) Diversions which *unreasonably* diminish the navigable capacity of navigable waters can only be authorized in furtherance of the protection and improvement of navigation. Reasons other than the improvement of navigation cannot be availed of by the Secretary as a basis for the approval of such a project.

(*b*) "The normal duty of the Secretary of War under Section 10 . . . is to maintain the navigable capacity of" (at p. 16) existing navigable waters rather than to sacrifice their capacity by diversions.

(*c*) There are certain projects having no relation to the improvement of navigation, but within the terms of the second and third clauses of section 10. If the Chief of Engineers recommends to the Secretary of War that such a project be approved on the ground that it will have no unreasonable adverse effect upon the navigable capacity of any stream, the Secretary acts within the scope of section 10 in permitting the project to be carried into effect (see *Wisconsin* v. *Illinois*, *supra*, at pp. 12 to 13; see *supra*, p. 10). In approving such projects the standard upon which the Secretary's determination is based is the effect of the proposed project upon existing navigable capacity.

The facts in the *Chicago Drainage* cases show that the War Department had in those cases consistently recognized the three principles of action just outlined. This is apparent from the action of successive Secretaries upon applications by the Sanitary District for approval of diversions. The permits granted fall into two groups:

1. It appears from the opinion (p. 6 *et seq.*) that the Sanitary District had in 1896, 1897, 1898, 1899, 1901, and 1903 obtained permits from the Secretary of War to divert water through the Sanitary Canal at a maximum rate under no permit greatly in excess of 4167 cubic feet per second (250,000 cu. ft. per min.). These permits were granted for a purpose clearly not very materially in aid of navigation, apparently upon the theory that such a diversion would not have any unreasonable adverse effect upon existing navigable capacity (with the possible exception of the permit of January 17, 1903, allowing a temporary additional diversion for the purpose of removing sewage deposit along the shores of a navigable water—see Special Master's Report, *Wisconsin* v. *Illinois*, p. 43). All of the permits above mentioned

by their terms (see Special Master's Report, *supra*, pp. 34 to 43) show a zealous desire on the part of the Secretary to preserve existing navigable capacity, at the same time permitting such diversions as would not cause an obstruction to existing navigable capacity. In 1907 and in 1913 (see Special Master's Report, pp. 48, 60-66), in consistent pursuance of this policy of the Department, applications for further diversions were refused by the Secretary on the ground that they would impair the navigable capacity of waters already used for navigation. In *Sanitary District of Chicago* v. *United States*, 266 U.S. 405, 429, the whole course of action by the successive Secretaries was comprehensively reviewed, and not only by the language of the decision, but also by the result of it, the rationale of their construction of section 10 was approved (see especially p. 429) by this Court.

2. The other type of permit considered in the case of *Wisconsin* v. *Illinois*, *supra*, was the temporary permit issued in 1925 (see Special Master's Report, p. 73), after the defendants in the *Sanitary District* case (266 U.S. 405) had been enjoined from diverting more than the amount actually and affirmatively permitted by the Secretary of War. The temporary permit unquestionably authorized a diversion which, if allowed to continue, would seriously damage the existing navigable capacity of the Great Lakes. It was conditioned upon removal by the Sanitary District of the cause of the excessive diversion by the construction of sewage disposal works. It rested for its validity, not upon the ground that the diversion would cause no injury to navigable capacity, but upon the ground that the diversion was affirmatively necessary to protect navigation in Chicago harbor from the deleterious effect of the sudden deposit of sewage inevitable if the preëxisting excess diversion were to be suddenly curtailed. Such a permit is in its essence separate and apart from a permit of the type granted earlier in the history of the Chicago diversions. The 1925 permit, though

temporary in character, rested on the affirmative necessity of action to protect navigation; the earlier permits, like those applied for in the case at bar, were little more than evidence of a determination by the Secretary of War, acting in accordance with his duty under section 10, that the diversions authorized would not in fact impair the navigable capacity of existing waterways. This Court, upon a bill in equity brought by States actually and substantially injured by the diversion, recognized that it was inequitable that the Sanitary District should create by its own wrong a situation which gave validity to a permit from which the District received great benefit (see opinion, *Wisconsin* v. *Illinois*, *supra*, p. 17). It therefore made provision for a decree which would bring about as rapidly as possible a restoration of the preëxisting navigable capacity of the Lakes without causing undue suffering and hardship to the people of Chicago; thus virtually doing precisely what the Secretary of War was endeavoring to do by the conditions imposed in the 1925 temporary permit.

The net result of the case of *Wisconsin* v. *Illinois* would seem to be, briefly:

1. To sustain the jurisdiction of the Secretary of War to make the determinations required of him by section 10 both—

(*a*) as to waiving objections, so far as public interest in navigation is concerned, to diversions which do not unreasonably interfere with existing navigable capacity, and—

(*b*) as to the necessity of action affirmatively in aid of navigation.

2. To protect those States having an interest in the maintenance of navigation in their enjoyment of previously existing navigable capacity—

(*a*) by enjoining unauthorized diversions;

(*b*) by treating as unauthorized diversions, diversions originally proper (as not affecting navigation) which have

been exceeded, thus creating an obstruction to navigable capacity which can be removed only by a cessation of both authorized and unauthorized diversions.

The case of *Wisconsin* v. *Illinois* has been examined here at such length only because the interpretation therein contained of section 10 is the most recent and most comprehensive yet undertaken by this Court. The case at bar depends upon the determination of what powers Congress has delegated by section 10 to the Secretary of War and to the Chief of Engineers, and we contend that the *Wisconsin* case in no way casts doubt upon the conclusion reached in the earlier case of *Sanitary District* v. *United States*, 266 U.S. 405. That case treated as duly authorized by Congress such diversions as were approved by the Secretary of War and the Chief of Engineers because of a determination that such diversions would have no adverse effect on navigable capacity. This was the view of *Sanitary District* v. *United States*, taken by this Court in *Wisconsin* v. *Illinois*, *supra*, at page 14 (see *supra*, p. 11).

B. The Determination which the Secretary of War and the Chief of Engineers are Required to Make with Respect to the Proposed Ware and Swift Diversions is purely a Determination of the Issue of Fact Committed to Them by Section 10, of whether the Diversions will Cause an Unlawful and Unreasonable Diminution of Navigable Capacity.

It appears from the complainant's motion to join the Secretary of War and the Chief of Engineers as defendants (par. 3) that on November 30, 1927, the Chairman of the Metropolitan District Water Supply Commission of the Commonwealth of Massachusetts filed with the War Department what purported to be a formal application (Motion, par. 3) for a permit to divert water in accordance with the terms of the Massachusetts legislation (see Answer, Ap-

pendix A, pp. 33 to 77). As appears from this letter, or application, the immediate occasion of the application was a suggestion by the District Engineer of the Corps of Engineers that such an application was advisable, and that a permit from the Secretary of War was necessary to make the proposed diversion a lawful diversion. The War Department chose to deal with the application by treating the two proposed diversions separately (Motion, par. 8), and promptly granted a permit or waiver of all objection to the Ware diversion "so far as the interests committed to this department are concerned" (Motion, par. 12). The Chief of Engineers, in his indorsement and recommendation (Motion, par. 12), affirmatively found as a fact that "the proposed diversion of waters in excess of 85,000,000 gallons per day (131 cubic feet) will have no adverse effect on the *Navigable Capacity* of the Connecticut river." This recommendation was approved by the Secretary of War.

The net result of this action by the War Department was to approve substantially the whole of the diversion authorized by the Massachusetts legislation. Certain minor and unimportant limitations upon the extent of the diversion, as authorized by the Massachusetts Legislature, were imposed by the War Department. [Whereas the Massachusetts legislation (St. 1926, c. 375, § 1; Answer, p. 34) authorized the diversion of flood waters from the Ware river, even during the months from June through November in each year, if the State Department of Health approved, the War Department did not approve any diversion during the period from June 15 through September 15 of each year (Motion, par. 12).]

The application for permission to divert the waters of the Swift river is still pending (Motion, par. 32), and the complainant alleges that the Secretary of War and the Chief of Engineers are prepared to make a similar determination that the proposed diversion of certain of the waters of the Swift river will not impair the navigable capacity of

the Connecticut river, and to notify the Commonwealth of Massachusetts that the Department will interpose no objection, so far as interests of navigation are concerned, to the Swift river project. There is no allegation in the motion that the Chief of Engineers and the Secretary of War, or either of them, were guilty of bad faith in making this decision of an issue of pure fact—an issue of fact which they were obliged to decide by section 10. At the most, the allegations contained in the motion only go to the extent of charging in general terms that the evidence before the Chief of Engineers would have led to a different conclusion. The principal basis of the motion is a mere dislike and disapproval of the conclusions of the Secretary of War and of the Chief of Engineers, without any specific or substantial allegations of facts compelling the belief that the Department was in fact wrong.

It is, of course, clearly unnecessary for the Secretary to deny permission for a present diversion which is not harmful to navigation, merely because at some future date a Federal project in aid of navigation may require, for purposes of storage for use in seasons of low water, the water now proposed to be diverted (see Motion, par. 17). The Secretary is bound to look only at the situation as it exists at the time of granting the application.

> *Louisville Bridge Co.* v. *United States,* 242 U.S. 409, 425.

This Court will not entertain an original bill seeking relief for a fanciful injury conceivably to be suffered in the distant future.

> *New York* v. *Illinois,* 274 U.S. 488, 490.
> *Florida* v. *Mellon,* 273 U.S. 12, 18.

We submit that the motion on its face reveals and admits that the Secretary of War and the Chief of Engineers—

1. Acted in good faith.

2. Made a reasonable, proper, and warranted finding of fact that the proposed diversion from the Ware river would have no adverse effect on navigation.

3. Are prepared to make a similar finding of fact with respect to the Swift diversion.

4. Acted in all respects within the scope of their duty under section 10, which was—

(*a*) to approve or waive objection to the project, though for a purpose not connected with the improvement of navigation, if the execution of the project would have no adverse effect on navigation;

(*b*) to withhold approval if the navigable capacity of existing waterways would be unreasonably impaired by the execution of the project.

These are the acts of the Secretary of War and of the Chief of Engineers which Connecticut seeks to have enjoined and revoked, and as a necessary preliminary to an injunction, both prohibitory and mandatory, she seeks to have those officials joined as parties in this action. Inasmuch as it is the contention of Massachusetts that the determination of the issue of fact by the Secretary of War and the Chief of Engineers made in good faith is not reviewable directly by judicial process, it is necessary to demonstrate precisely how much finality is given by law to that determination.

C. A Determination of an Issue of Fact within Section 10 by the Secretary of War upon Recommendation by the Chief of Engineers is Final if Made in Good Faith. This Court will Not Enjoin the Secretary from Performing his Duty under Section 10 and will not Review the Propriety of his Decision Directly.

The complainant, the State of Connecticut, here seeks a direct review of the accuracy of the determination of the Secretary of War with respect to the effect of the proposed

diversions. The Commonwealth of Massachusetts, for the purposes of the present argument only, raises no question of the standing of the State of Connecticut to seek a judicial determination of the rights of the two quasi-sovereign States *inter se*. That right would seem to be established by the decisions of this Court.

> *Wisconsin* v. *Illinois and Sanitary District*, *supra*, at p. 10 of the Official Advance Sheets, and cases there cited.
> *Kansas* v. *Colorado*, 185 U.S. 125.

In the principal case, so far as the defendant, Massachusetts, should seek to avail itself of the Secretary's determination as an excuse or as a justification for its proposed action, it is probable that this Court, following its action in the case of *Wisconsin* v. *Illinois and Sanitary District*, *supra*, would determine whether or not the Secretary's authorization was valid and issued in accordance with constitutional and statutory requirements. This Court also probably would decide in the principal case whether or not the proposed diversion would constitute a violation of the property rights or other tangible interests of the State of Connecticut or of its citizens. The Secretary's authorization, taken apart from the acts by which the proposed diversion will be accomplished, has no positive effect as a threatened infringement of those interests of Connecticut which are susceptible of judicial cognizance and protection. Nevertheless, Connecticut now demands that the determination of fact which the Secretary is bound to make by the terms of section 10 be enjoined and revoked, though in and of itself that determination cannot take from the Connecticut river a drop of water to which Connecticut may be entitled.

This Court has always held that Congress had full constitutional authority to decide what things constituted ob-

structions to navigation and what things did not. The cases on the subject are comprehensively reviewed in the Report of the Special Master in the case of *Wisconsin* v. *Illinois and Sanitary District* (see pp. 161 to 165). The special master summarizes his conclusions (at p. 164):

> "The question whether such an abstraction should be altogether prohibited, or the extent to which it should be permitted with regard to the interests of navigation, when and in what circumstances and in what amount a diversion of water from the lake would constitute an obstruction to navigation, are questions within the power of Congress to decide in the exercise of its control over navigable waters for the purposes of navigation. When these questions have been determined by Congress, or under its authority validly conferred, they are not open to reconsideration by the court."

When the *Wisconsin* case was decided by this Court, it cut under the rule of law laid down by the master and by the Secretary, for, as we have indicated above, this Court decided, as a matter of equity between two parties (properly before the court acting within its original jurisdiction), that one party could not be allowed, by committing a nuisance, to create a situation which made necessary a remedial permit from the Secretary of War (see *supra*, pp. 15-16). The Secretary in 1925 was faced with a situation of fact and upon that situation made a valid determination in the interests of navigation. This Court in no sense disapproved the propriety of that determination, but held it proper. The court, however, did order that the Sanitary District remove the occasion for its inequitable conduct so that the Secretary would not be forced to a determination which would result in an impairment of existing navigable capacity on the Lakes. The finality of the Secretary's de-

termination upon a given set of facts was, we submit, in no degree questioned, and the language of the *Wisconsin* case (especially at pp. 13-14) gives every indication that this Court approved the conclusion of the special master following earlier decisions of this Court:—

1. That Congress could itself finally determine whether a diversion would obstruct navigable capacity.

2. That Congress could delegate that duty to the Secretary of War and his staff of expert subordinates, who were particularly fitted to make the determination of fact.

3. That the determination made in good faith was not subject to direct judicial review.

The earlier cases raise the problem more directly.

It is, of course, fundamental that the interest of the Federal government in the control of navigable water rests upon the Congressional power to regulate interstate commerce (U.S. Const., art. I, § 8, cl. 3). Indeed, "the right of the United States in the navigable waters within the several States is limited to the control thereof for the purposes of navigation."

> *Port of Seattle* v. *Oregon &c. R. Co.*, 255 U.S. 56, 63.
>
> *United States* v. *Chandler-Dunbar Co.*, 229 U.S. 53, 62, *et seq.*, and cases there cited.

No contention is now made by Massachusetts that the interest of the Federal government in the proposed Ware and Swift rivers diversions extends to anything other than the protection of the general public interest in the maintenance of the navigable capacity of the Connecticut river. We submit that upon the applications for approval of these diversions the whole duty of the Secretary of War and of the Chief of Engineers is to decide whether those diversions would unreasonably impair the navigable capacity of the Connecticut river. If the Secretary should find that they

would adversely affect navigation, it would be his duty to forbid them to the extent that he found them to be excessive. If the diversions are found to be harmless so far as navigation is concerned, it is the plain duty of the Secretary to waive all right to object so far as any claim of the Federal government is concerned. This is substantially what he has done in the case of the Ware river application (Motion, par. 12), and what he is alleged by the complainant, the State of Connecticut, to be planning to do in the case of the Swift application (Motion, par. 32). It is apparent, therefore, that:

1. Massachusetts makes no claim that the Secretary should authorize the proposed diversions—

(*a*) if they substantially injure the navigable capacity of the Connecticut river;

(*b*) upon any contention (based upon the facts apparent upon this record as it now stands) that the proposed diversions are in aid of Federal or State improvements of navigation.

[The Commonwealth of Massachusetts, however, reserves its right to prove in the principal case that the limitations placed upon the diversions, both by the Massachusetts legislation and by the approval about to be granted by the War Department, will result in an increased flow in the Connecticut river during dry seasons, when water is most needed for purposes of navigation, over and above the flow which would normally occur. This will result from the release of stored waters in excess of the actual flow in the Swift river on a considerable number of days each summer. These facts do not appear on this record, and are here stated purely for the purpose of reserving the rights of Massachusetts.]

2. Massachusetts contends that the proper action of the Secretary is in the nature of a waiver of objections based on the absence of any injury to Federal interests, rather than affirmative furtherance of a quasi-Federal project.

We submit, therefore, that the action sought by Massachusetts from the Secretary of War and granted by him, or about to be granted by him, is well within the scope of constitutional action by Congress as delegated to the Secretary by section 10 (*supra*, p. 12). Where the Secretary is acting to aid navigation, or is indicating that there is no injury to the Federal interest therein, his determinations of fact have always been treated as final, so far as Federal interests are concerned, by this Court, and as not subject to judical review.

Pennsylvania v. *Wheeling Bridge Co.*, 18 How. 421, 430, as affecting s.c. 13 How. 518, 625.

South Carolina v. *Georgia*, 93 U.S. 4, 12.

Miller v. *Mayor*, 109 U.S. 385, 393, 395.

Monongahela Bridge Co. v. *United States*, 216 U.S. 177, 195.

Philadelphia Co. v. *Stimson*, 223 U.S. 605, 635, and cases there cited.

United States v. *Chandler-Dunbar Co.*, 229 U.S. 53, 64-65.

Louisville Bridge Co. v. *United States*, 242 U.S. 409.

Southern Pacific Co. v. *Olympian Dredging Co.*, 260 U.S. 205, 210, and cases cited.

The *Monongahela Bridge Co.* case is explicit upon the question. The Secretary of War (the present Chief Justice), acting under section 18 of the Act of March 3, 1899 (30 STAT. AT L. 1151, 1153, U.S. Code, Tit. 33, § 502), had ordered that the bridge there in question be so altered as to render it no longer an obstruction to navigation. A criminal information was filed stating non-compliance by the defendant company with the terms of the Secretary's order and the jury returned a verdict of guilty. By a motion in arrest of judgment the constitutionality of the Act of 1899 was contested. The motion was denied and a fine imposed. This Court upon writ of error held:

1. That the Act of March 3, 1899, laid down a (at p. 192) "general rule, applicable to all navigable waters, that free navigation should not be hampered by unreasonable obstructions . . . ; that . . . Congress charged the Secretary of War with the duty of ascertaining, in each case, . . . whether the particular bridge came within the general rule prescribed; that any other method was impracticable in view of the vast and varied interests of the Nation requiring legislation . . ."

2. That the Secretary must not act in arbitrary fashion, but must give notice and an opportunity to be heard to parties interested, and must allow a reasonable time for alterations. (Parenthetically, it may be here pointed out that there is no allegation in the bill, or pending motion in the case at bar, that the State of Connecticut has not had full opportunity to present all her claims. Paragraphs 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 26, and 30 of the motion contain allegations which affirmatively show not only a comprehensive study of the whole situation by the War Department, but also that Connecticut has been heard at length by the Secretary and his subordinates at all stages of the proceedings.)

3. That the decision of the Secretary, made in good faith, is final to all intents and purposes and that (at p. 195)—

> "It was not for the jury to weigh the evidence and determine according to *their* judgment, as to what the necessities of navigation required, or whether the bridge was an unreasonable obstruction. The jury might have differed from the Secretary. That was immaterial; for Congress intended by its legislation to give the same force and effect to the decision of the Secretary of War that would have been accorded to direct action by it on the subject. It is for Congress, under the Constitution, to regulate the right of navigation by all appro-

priate means, to declare what is necessary to be done in order to free navigation from obstruction, and to prescribe the way in which the question of obstruction shall be determined. Its action in the premises cannot be revised or ignored by the courts or by juries, except that when it provides for an investigation of the facts, upon notice and after hearing, before final action is taken, the courts can see to it that Executive officers conform their action to the mode prescribed by Congress."

II.

No Controversy of a Justiciable Nature Exists between the State of Connecticut and the Secretary of War and the Chief of Engineers.

The motion now pending before this Court seeks to join two important officials of the War Department as parties defendant in an original equity suit between two States of the Union. The purpose of making the Secretary of War and the Chief of Engineers parties is purely that they may be enjoined from performing to the best of their ability duties reposed in them by Congress under a general standard of administrative action—the decision of a pure question of fact upon which their decision is final in the absence of bad faith. Massachusetts contends that the State of Connecticut has no standing either in her proprietary capacity or as *parens patriae* to maintain a bill in equity against these officials, and that, even assuming that Connecticut has in this Court a *locus standi* as party plaintiff as against the War Department, there is no actual or threatened present injury to the complainant by reason of the action or proposed action of the Secretary of War or Chief of Engineers. Connecticut, if she has any remedy, has it, we contend, in this Court upon the principal bill against the Commonwealth of Massachusetts and can there assert the invalidity of any action by the Secretary of War and his subordinates in so

far as that action may be improper, if Massachusetts seeks to make use of such action as a justification or excuse for the proposed diversions.

A. Connecticut as a Property Owner or in any Proprietary Capacity has No Standing to Maintain a Bill against the Secretary of War to Enjoin his Performance of his Duty under Section 10.

Connecticut's standing as an owner of property rests upon the ownership by the State of certain riparian lands along the Connecticut river used for public purposes (Bill, par. 12, p. 6). As such an owner we concede, for the purposes of the argument of this motion, that the State of Connecticut has a standing in an original suit in this Court if a justiciable question is presented by the controversy brought here for decision. It is the contention of Massachusetts that no controversy in which the Secretary of War or Chief of Engineers is a proper party, and which is capable of judicial settlement, is presented in this cause.

It is the settled doctrine of this Court that it has no inherent power—

> "*per se* to review and annul acts of Congress on the ground that they are unconstitutional. That question may be considered only when the justification for some direct injury suffered or threatened, presenting a justiciable issue, is made to rest upon such an act. Then the power exercised is that of ascertaining and declaring the law applicable to the controversy. It amounts to little more than the negative power to disregard an unconstitutional enactment, which otherwise would stand in the way of the enforcement of a legal right. The party who invokes the power must be able to show not only that the statute is invalid but that he has sustained or is immediately in danger of sustaining some direct injury as the result of its enforcement, and not

merely that he suffers in some indefinite way in common with people generally. If a case for preventive relief be presented the court enjoins, in effect, not the execution of the statute, but the acts of the official, the statute notwithstanding. Here the parties plaintiff have no such case. Looking through forms of words to the substance of their complaint, it is merely that officials of the executive department of the government are executing and will execute an act of Congress asserted to be unconstitutional; and this we are asked to prevent. To do so would be not to decide a judicial controversy, but to assume a position of authority over the governmental acts of another and co-equal department, an authority which plainly we do not possess."

(Mr. Justice *Sutherland*, speaking for this Court in *Massachusetts* v. *Mellon*, 262 U.S. 447, 488-489.)

See also *Florida* v. *Mellon*, 273 U.S. 12, 16-18.

New Jersey v. *Sargent*, 269 U.S. 328, 330, *et seq.*, and cases cited.

In the case at bar the acts of the Secretary of War and of the Chief of Engineers, as we have shown above (*supra*, p. 26), are in substance and in effect the acts of Congress itself under a valid delegation of power.

Philadelphia Co. v. *Stimson*, 223 U.S. 605, 638.

Louisville Bridge Co. v. *United States*, 242 U.S. 409, 424.

Southern Pacific Co. v. *Olympian Dredging Co.*, 260 U.S. 205, 208, 210, and cases cited.

We submit, therefore, that the determination of the Secretary of War, thus acting for Congress, should receive from this Court the same deference for the valid and *prima facie* constitutional action of a coördinate branch of the govern-

ment, which would be paid to the direct action of Congress itself.

The language of this Court in *Massachusetts* v. *Mellon*, quoted above (*supra*, p. 28), is, we contend, apposite in the case at bar unless Connecticut can show that, by the performance of his duty under section 10, the Secretary of War definitely and immediately threatens some property interest of Connecticut itself (as distinguished from an interest of the individual citizens of Connecticut. We submit that Connecticut has no standing as *parens patriae* in this matter so far as action against the War Department officials is concerned—see *infra*, p. 35). It was upon the basis of a direct and immediate threatened injury to a State property, or *quasi*-sovereign right, that this Court took jurisdiction of a truly justiciable controversy in *Missouri* v. *Holland*, 252 U.S. 416. In that case (at p. 431) the *quasi*-sovereign right of the State to regulate the taking of game was held to furnish a sufficient jurisdictional basis (together with the alleged pecuniary interest of the State as owner of the wild birds within its borders) to support a bill seeking to enjoin the enforcement, immediately threatened, of the Migratory Bird Treaty Act by the defendant Federal Game Warden. The bill alleged that the statute was unconstitutional. This Court affirmed a decree dismissing the bill, after deciding that the statute was valid. The acts of the Federal officials there sought to be enjoined were immediately threatened. The *quasi*-sovereign rights of the State and such property rights as the State had were put in immediate jeopardy, for although the Federal statute there questioned might eventually have been held unconstitutional, its enforcement would, if not enjoined, at least suspend temporarily the ability of the State to assert its interests as against the claim of right of a paramount power. Even the basis of jurisdiction, so far as based on property rights inherent in the State, was discredited by this Court (at p. 434). In the language of Mr. Justice *Holmes*: "To put the

claim of the State upon title is to lean upon a slender reed."

The case at bar is clearly distinguishable from the situation in *Missouri* v. *Holland* upon the following grounds:

1. The property interests of the State of Connecticut, though at least as trivial as those considered by this Court in the *Holland* case, are in no immediate danger by reason of the determination of the Secretary of War that the proposed diversions constitute no injury to the navigable capacity of the Connecticut river.

(*a*) That determination, even if wrong in fact, in no way will take from the Connecticut river any water to which the State of Connecticut is entitled as riparian owner (Bill, par. 12, p. 6). The diversion will not be the act of the Secretary of War, even if it takes place. He has merely indicated that, so far as the national interest in the preservation of the navigable capacity of the Connecticut river is concerned, there is no ground for objection to the project. The act which Connecticut alleges is wrongful, and the only act which is seriously alleged to threaten her property, is the proposed diversion by Massachusetts.

(*b*) The rights of Connecticut with respect to that diversion can be fully tried out in the principal case, and Connecticut has, we submit, a full remedy, if indeed she is in any way entitled to relief, as against Massachusetts. In the principal case, so far as Massachusetts may assert that the action of the Secretary of War is an excuse or a justification for any wrongful action, Connecticut may attempt to show that the action of the Secretary was invalid, so far as that action is reviewable in any proceeding. Such consideration was given to the acts of the Secretary of War with respect to the Chicago Drainage Canal.

See *Wisconsin* v. *Illinois and Sanitary District*, *supra*, at p. 16 *et seq.* of Official Advance Sheets.

Sanitary District v. *United States*, 266 U.S. 405, 429-431.

(*c*) So far as Connecticut may seek to treat the action of the Secretary, together with the diversions proposed by the Massachusetts statutes, as a single project threatening the property interests of Connecticut, there are no substantial allegations of fact that the danger of diversion by Massachusetts is in any way immediate (see, however, Bill, p. 11). This appears from an affirmative allegation of the defendant's answer, which has not been denied by Connecticut (Answer, par. 20, p. 23), where it is stated:

> "The defendant further admits that unless enjoined from so doing it intends to proceed with the work authorized by the Great and General Court of Massachusetts in Acts of 1926, chapter 375, and Acts of 1927, chapter 321; that it is proposing to proceed with such work because of the pressing emergency confronting the Commonwealth with respect to providing a suitable, necessary, and adequate supply of water for drinking and domestic purposes for the city of Boston and for the metropolitan district about said city; that unless a supply is furnished within a very short period the inhabitants of the said area in and about the city of Boston will be subjected to grave and serious dangers of epidemic and disease, and that the inhabitants of the said area will have insufficient water to meet their necessary and reasonable requirements for drinking purposes; that the construction of the work proposed for the diversion described herein and authorized by the said acts will take a considerable number of years, and *that the first works for the diversion of the flood waters of the Ware River cannot*, according to the best information at the disposal of the defendant, *in any event be completed before 1931*, and that

until that time no diversion of water from the Connecticut River watershed will be effected by the said works; that by the said diversion, as has been alleged and averred above, only the flood waters of the Ware River, as described in said act, and certain of the waters of the Swift River will be diverted, in no way causing any appreciable diminution in the flow of the Connecticut River at the point where the said Connecticut River enters the State of Connecticut." [Italics ours.]

Even treating the action of the Secretary in waiving all right to object (by the grant of a revocable approval of the Massachusetts project) as merely an important step in the execution of that project, the interests of Connecticut, if any, may be and can be fully protected by an injunction running against Massachusetts alone, for reasons already stated (see *supra*, pp. 30 to 32). In no event is there such threat of present or direct injury by the Secretary of War as should lead this Court to enjoin the Secretary from performing his duty to the best of his ability.

See *Massachusetts* v. *Mellon*, 262 U.S. 447, 488.
Florida v. *Mellon*, 273 U.S. 12, 18.
New York v. *Illinois & Sanitary District*, 274 U.S. 488, 490.
Cf. New Jersey v. *Sargent*, 269 U.S. 328, 330-334.

2. Any title which the State of Connecticut may assert in the case at bar to riparian rights appurtenant to land bordering on the Connecticut river is a title which is subordinate to the Federal easement in all navigable streams for the purposes of furthering and protecting navigable waters.

See *United States* v. *River Rouge Improvement Co.*, 269 U.S. 411, 419.

The Secretary's determination as to whether or not the proposed diversion will constitute an obstruction to the navigable capacity of the river is, as we have stated frequently above (see *supra*, pp. 10, 20), purely a determination as to whether or not the project, if executed, will constitute an injury to this Federal easement. The State of Connecticut, holding title as it does subject to this easement, cannot, we submit, object if the holder of this easement determines in good faith that the proposed project will not injuriously affect the easement.

In the case of *Missouri* v. *Holland*, on the other hand, the claim of title and quasi-sovereign right there asserted was not alleged to be subject to any superior Federal claim with respect to the precise interest which Missouri there sought to protect. Inasmuch as the Constitution of the United States clearly gives to Congress the power to regulate navigable waters as part of its power to regulate interstate commerce, and since Congress, by a delegation of power to the Secretary of War, has assumed control of navigation, such interest as the State of Connecticut may have as a proprietor in the preservation of navigation is, in substance, no different from the same interest which any individual member of the public may have, and we submit that if Congress, through its properly designated agent, determines that a project has no tendency to obstruct navigation, that determination as a finding of fact made in good faith furnishes no ground for judicial relief as against the officers making the determination.

We submit that the following language in the case of *Massachusetts* v. *Mellon*, 262 U.S. 447, at 484, is pertinent to the motion at bar:

> "It follows that in so far as the case depends upon the assertion of a right on the part of the State to sue in its own behalf we are without jurisdiction. In that aspect of the case we are called upon to adjudicate, not

rights of person or property, not rights of dominion over physical domain, not quasi-sovereign rights actually invaded or threatened, but abstract questions of political power, of sovereignty, of government. No rights of the State falling within the scope of the judicial power have been brought within the actual or theatened operation of the statute and this Court is as much without authority to pass abstract opinions upon the constitutionality of acts of Congress as it was held to be, in *Cherokee Nation* v. *Georgia*, *supra*, of state statutes."

B. Connecticut as a State has No Standing as Parens Patriae Representing the General Welfare of its Citizens to Seek to Enjoin any Determination of the Secretary of War and of the Chief of Engineers Made in Compliance with their Duty Prescribed by Section 10.

It is clear that the State of Connecticut has no standing as *parens patriae* to take action in behalf of its individual citizens or in behalf of its citizens generally because of any injury said to be caused by the Federal government or its duly constituted agents. The citizens of Connecticut are also citizens of the United States and subject to its laws.

Florida v. *Mellon*, 273 U.S. 12, 18.

It is well settled that, with respect to the relations of citizens of the United States with the Federal government, "it is the United States, and not the State, which represents them as *parens patriae*, when such representation becomes appropriate; and to the former, and not to the latter, they must look for such protective measures as flow from that status."

Massachusetts v. *Mellon*, 262 U.S. 447, 485-486.

CONCLUSION.

We submit, for the reasons stated above, that there is no merit in the contentions made in behalf of the State of Connecticut, and that the motion for leave to file the pending motion should be denied. If this Honorable Court should consider the motion upon its merits, we contend that it also should be denied.

It is, of course, true that this Honorable Court may desire to hear argument from counsel representing the Secretary of War and the Chief of Engineers before disposing of the pending motion. In case the court should so wish, we respectfully call the attention of the court to the situation now confronting the Commonwealth of Massachusetts. As set out at length in the answer filed by Massachusetts, a grave and serious emergency confronts the area near Boston (see Answer, pp. 23-24). After careful study the project outlined in the Massachusetts legislation was adopted as the only feasible measure for solving the problem of a water supply for the Metropolitan District (Answer, p. 21). In no event can the first water to be diverted for the use of Boston become available before 1931 at which time the need of water will probably be considerably more pressing even than at present (Answer, p. 23). It is necessary that the engineering work go forward rapidly, with the consequent expenditure of very large sums of money. Naturally Massachusetts does not care to expend millions of dollars upon a project, which has been the subject of inquiry by the Secretary of War, without having his approval of the project, so far as the Federal interest in the protection of navigation is concerned. The pendency of the present motion is the only obstacle standing in the way of Massachusetts in obtaining that approval.

We respectfully request, therefore, that, if the Secretary of War and the Chief of Engineers be ordered by this Honorable Court to show cause why they should not be

joined as parties defendant, the rule or other order issuing to them be made returnable upon some motion day prior to the expiration of the present term of this Court, so that, if possible, the pending motion may be disposed of prior to the adjournment of this Honorable Court.

Respectfully submitted,

JOSEPH E. WARNER, Attorney General of the Commonwealth of Massachusetts.

BENTLEY W. WARREN, Special Assistant Attorney General of the Commonwealth of Massachusetts.

GERALD J. CALLAHAN, Assistant Attorney General of the Commonwealth of Massachusetts.

R. AMMI CUTTER, Assistant Attorney General of the Commonwealth of Massachusetts.

FILE COPY

Office Supreme Court, U.S.
FILED
OCT 30 1929
CHARLES ELMORE CROPLEY
CLERK

In the Supreme Court of the United States

OCTOBER TERM, 1929.

2

No. 12, ORIGINAL. IN EQUITY.

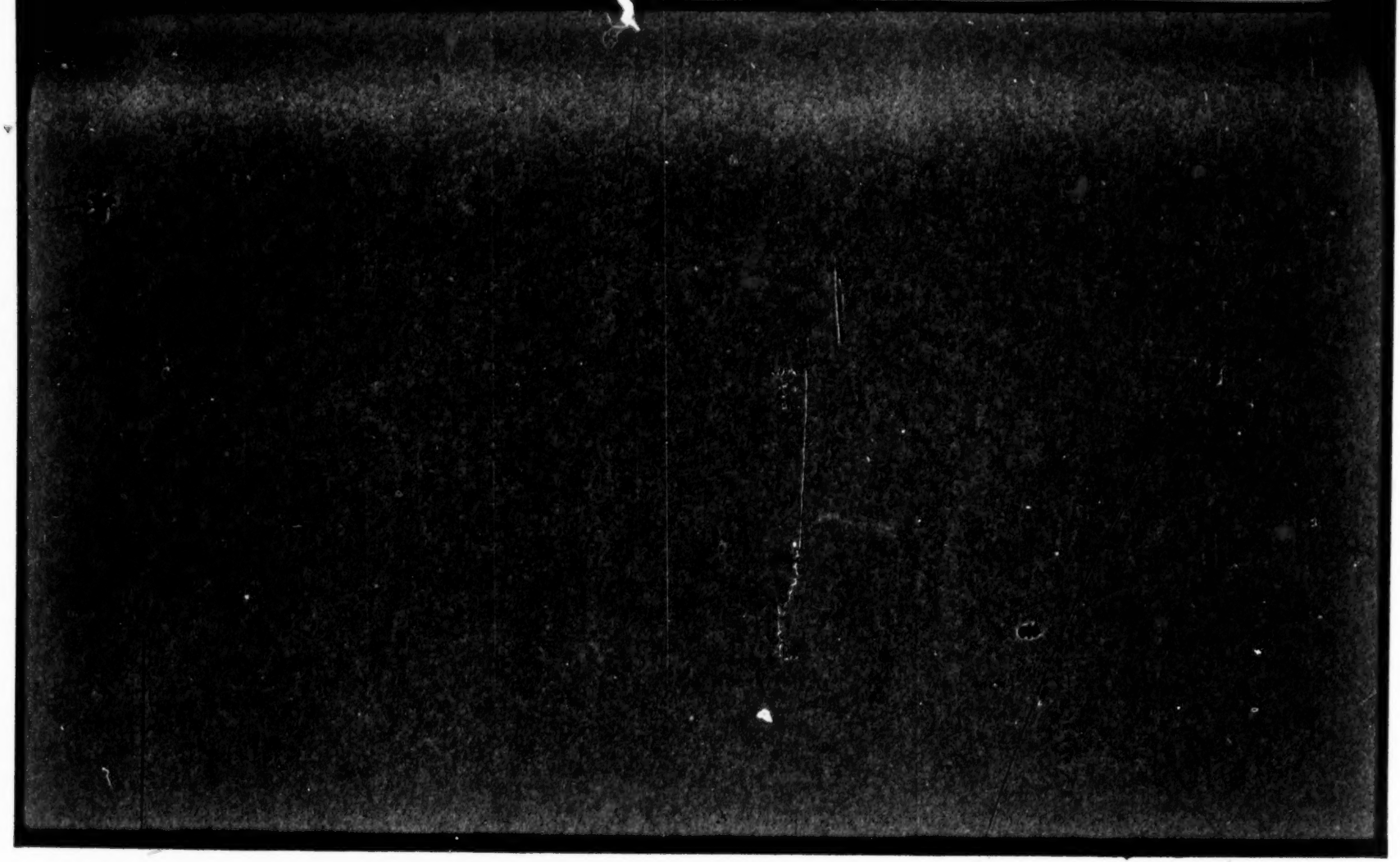
THE STATE OF CONNECTICUT,
Complainant,

v.

THE COMMONWEALTH OF MASSACHUSETTS,
Defendant.

MOTION FOR THE APPOINTMENT OF A SPECIAL MASTER

JOSEPH E. WARNER,
Attorney General of Massachusetts.
BENTLEY W. WARREN,
Special Assistant Attorney General of Massachusetts.
GERALD J. CALLAHAN,
Assistant Attorney General of Massachusetts.
R. AMMI CUTTER,
Assistant Attorney General of Massachusetts.



In the
Supreme Court of the United States

OCTOBER TERM, 1929.

No. 13, ORIGINAL. IN EQUITY.

THE STATE OF CONNECTICUT,
Complainant,

v.

THE COMMONWEALTH OF MASSACHUSETTS,
Defendant.

NOTICE.

To the State of Connecticut, the complainant herein; to the Honorable Benjamin W. Alling, Attorney General of said State; and to Ernest L. Averill, Esq., and to Benedict M. Holden, Esq., both of Hartford, Connecticut, of counsel in said case:

Please take notice that at the incoming of the Supreme Court of the United States at twelve o'clock noon at the Capitol Building in the City of Washington, District of Columbia, on Monday, November 4, 1929, or as soon thereafter as counsel can be heard, the above-named defendant will appear by its attorneys and present to said court the attached motion for leave to file a motion for the appointment of a special master.

THE COMMONWEALTH OF MASSACHUSETTS,

By JOSEPH E. WARNER,
Attorney General of Massachusetts.

BENTLEY W. WARREN,
Special Assistant Attorney General of Massachusetts.

GERALD J. CALLAHAN,
Assistant Attorney General of Massachusetts.

R. AMMI CUTTER,
Assistant Attorney General of Massachusetts.

THE STATE OF CONNECTICUT.

COUNTY OF

Service of the above notice by the delivery to me of a copy thereof, together with a copy of a motion for leave to file and a motion for the appointment of a special master is hereby acknowledged this day of October, 1929.

In the
Supreme Court of the United States

OCTOBER TERM, 1929.

No. 13, ORIGINAL. IN EQUITY.

THE STATE OF CONNECTICUT,
Complainant,

v.

THE COMMONWEALTH OF MASSACHUSETTS,
Defendant.

MOTION FOR LEAVE TO FILE MOTION FOR THE APPOINTMENT OF A SPECIAL MASTER.

And now comes the Commonwealth of Massachusetts, by Joseph E. Warner, its Attorney General, and moves this Honorable Court for leave to file the attached motion for the appointment of a special master in the said cause.

THE COMMONWEALTH OF MASSACHUSETTS,

By JOSEPH E. WARNER,
Attorney General of Massachusetts.

BENTLEY W. WARREN,
Special Assistant Attorney General of Massachusetts.

GERALD J. CALLAHAN,
Assistant Attorney General of Massachusetts.

R. AMMI CUTTER,
Assistant Attorney General of Massachusetts.

In the
Supreme Court of the United States

OCTOBER TERM, 1929.

No. 13, ORIGINAL. IN EQUITY.

THE STATE OF CONNECTICUT,
Complainant,

v.

THE COMMONWEALTH OF MASSACHUSETTS,
Defendant.

MOTION FOR THE APPOINTMENT OF A SPECIAL MASTER.

And now comes the Commonwealth of Massachusetts, by Joseph E. Warner, its Attorney General, and moves this Honorable Court that it appoint a special master to take testimony upon the issues of fact pending in the above-entitled cause, to prepare and file findings of fact based upon the said testimony, and to make recommendations for a decree in the said cause.

THE COMMONWEALTH OF MASSACHUSETTS,

By JOSEPH E. WARNER,
Attorney General of Massachusetts.

BENTLEY W. WARREN,
Special Assistant Attorney General of Massachusetts.

GERALD J. CALLAHAN,
Assistant Attorney General of Massachusetts.

R. AMMI CUTTER,
Assistant Attorney General of Massachusetts.

FILE COPY

NOV 25 1929
CHARLES ELMORE CRO
CLER

In the

Supreme Court of the United States.

OCTOBER TERM, 1929.

NO. 12, ORIGINAL.

THE STATE OF CONNECTICUT,
COMPLAINANT.

v.

THE COMMONWEALTH OF MASSACHUSETTS,
DEFENDANT.

BRIEF OF MASSACHUSETTS, IN OPPOSITION TO

1. Motion for Leave to File Motion to Dismiss the Defendant's Answer;
2. Motion to Dismiss the Defendant's Answer;
3. Motion for Leave to File Motion to Strike Out Portions of the Defendant's Answer;
4. Motion to Strike Out Portions of the Defendant's Answer.

JOSEPH E. WARNER,
Attorney General of Massachusetts.
BENTLEY W. WARREN,
Special Assistant Attorney General.
GERALD J. CALLAHAN,
Assistant Attorney General.
R. AMMI CUTTER,
Assistant Attorney General.

ADDISON C. GETCHELL & SON, LAW PRINTERS, BOSTON.

SUBJECT INDEX AND SUMMARY OF ARGUMENT.

	Page
STATEMENT OF THE CASE	1-15
Connecticut's unsuccessful attempt to join War Department officials as parties respondent	4
Applications by Massachusetts to the War Department for permission to make the proposed diversions —Action thereon by the War Department	4
The requested amendments of the answer	6
Summary and analysis of the present motions and of the arguments of the parties	6-15
The Connecticut motion to dismiss the answer	6-10
Contentions of Connecticut	6
Contentions of Massachusetts in opposition to the allowance of the motion to dismiss	8
The Connecticut motion to strike out certain portions of the Massachusetts answer	10-15
Connecticut's contentions of law upon the motion to strike out	12
The contentions of law made by Massachusetts in opposition to the allowance of leave to file and to the allowance of the motion to strike out portions of the answer	13
POINTS AND AUTHORITIES	16-58
I. The action of the Secretary of War and the Chief of Engineers upon the applications for the approval of the contemplated diversions constituted a proper performance of the duties delegated to them by the Act of Congress of March 3, 1899. That action constitutes an authorization of the diversion (within the limits specified in the War Department orders), so far as navigation is concerned, and forecloses any contention of Connecticut that the diversion will injure navigation, in the absence of proof of bad faith	16-41
A. The duty of determining whether any given diversion of water, which if not diverted will flow into a navigable stream, will constitute or cause an obstruction of the navigable capacity of that stream devolves upon the Secretary of War and the Chief of Engineers under the Act of March 3, 1899. No direct action by Congress is necessary	16
The Wisconsin case	18

Page

Contemporary construction of section 10 19
Summary of the Wisconsin case 21
Standards of administrative action by the Secretary of War 23
Analysis of War Department permits in drainage cases 23
1. Determinations that proposed diversions would have no adverse effect on navigation 24
2. Temporary permit in aid of navigation 25
War Department action in present case 27
No War Department permit needed for structures in non-navigable tributaries of navigable streams 28
B. The determinations of the Secretary of War upon the contemplated Swift and Ware diversions constitute a valid authorization of those diversions so far as the question of navigability is concerned 30
1. The correctness of the Secretary's determination cannot be reviewed, in the absence of proof of bad faith or failure to comply with applicable procedural requirements 30
2. Congress having undertaken a comprehensive scheme for the protection of navigation, the whole subject-matter, so far as within the scope of existing Congressional regulation, is the exclusive concern of Congress and of the War Department, by delegation of the power of Congress 34
C. Only the navigability issue is concluded by the War Department orders 38
D. The certain benefit in fact to the navigability of the Connecticut river as the result of the storage of water in the Swift river valley (particularly as modified by the War Department orders) strengthens the necessity of giving to the War Department orders conclusive effect upon the issue of navigability 39
E. The allegations both of the original and of the amended answer deny that any injury to navigation is caused by the project. Issues of fact are thus raised which are appropriate for consideration by a special master appointed by this Court; provided that this Court should deem it proper, notwithstanding the action of the War Department, to consider the issue of the effect of the project upon navigation 40

Page

II. Upon the issues raised by the answer, Massachusetts alleges facts which, if proved, constitute a full and adequate defense to the bill of complaint. The motions to dismiss and to strike out the answer should be denied and the case should be committed to a special master.. 41-58

A. As a matter of law the facts alleged in the answer, if taken to be true, constitute a full defense to the bill, and specific equitable relief should be denied..... 41

1. Under the riparian law in force both in Massachusetts and in Connecticut a riparian owner is entitled to make a reasonable use of the waters flowing past his land, having due regard for the interests of upper and lower riparian owners upon the same stream 42

2. Upon the allegations of fact contained in the defendant's answer, as amended, under the law applied by this Honorable Court in litigation as between States of the Union, Connecticut would not be entitled to relief in equity..... 49

B. As a matter of discretion, this Honorable Court should deny the motions of Connecticut and should commit this case to a special master for findings of fact 56

TABLE OF CASES CITED.

Balf Co. v. Hartford Electric Light Co., 106 Conn. 315.. 45
Beckerle v. Danbury, 80 Conn. 124..... 46
Blodgett v. Holden, 275 U.S. 142..... 29
Brookline v. Mackintosh, 133 Mass. 215..... 47
Buddington v. Bradley, 10 Conn. 212..... 43
Collins Mfg. Co. v. Wickwire Co., 14 Fed. (2d) 871..... 42, 46
DeWitt v. Bissell, 77 Conn. 531..... 47
Donnelly Brick Co. v. New Britain, 106 Conn. 167; 137 Atl. 745 ..... 43, 46
Elliot v. Fitchburg R.R., 10 Cush. 191..... 43, 44
Florida v. Mellon, 273 U.S. 12..... 28
Gibson v. United States, 166 U.S. 269..... 34
Gillett v. Johnson, 30 Conn. 180..... 43, 44
Gilman v. Philadelphia, 3 Wall. 713..... 34
Harding v. Stamford Water Co., 41 Conn. 87..... 45, 46

Page

Harris v. Mackintosh, 133 Mass. 228 46
Hazard Powder Co. v. Somersville Mfg. Co., 78 Conn. 171 43
Hittinger Fruit Co. v. Cambridge, 218 Mass. 220 43
Ingraham v. Dunnell, 5 Met. 118 47
Isbell v. Greylock Mills, 231 Mass. 233 ..... 43, 44
Kansas v. Colorado, 185 U.S. 125 ..... 10, 41, 47, 50
Kansas v. Colorado, 206 U.S. 46 ..... 9, 10, 36, 39, 41, 47, 50, 51
Keeney & Wood Mfg. Co. v. Union Mfg. Co., 39 Conn. 576 43, 44
Lawton v. Herrick, 83 Conn. 417 46
Louisville Bridge Co. v. United States, 242 U.S. 409 ..... 28, 32
Martin v. Gleason, 139 Mass. 183 46
Mason v. Whitney, 193 Mass. 152 ..... 42, 43
McNamara v. Taft, 196 Mass. 597 ..... 42, 43, 46
Merrifield v. Lombard, 13 Allen 16 46
Miller v. Mayor, 109 U.S. 385 31
Missouri v. Illinois, 180 U.S. 208 50
Missouri v. Illinois, 200 U.S. 496 ..... 37, 47, 50, 51, 53
Monongahela Bridge Co. v. United States, 216 U.S. 177 31
Morgan v. Danbury, 67 Conn. 484 46
New Jersey v. Sargent, 269 U.S. 328 53
New York v. Illinois, 274 U.S. 488 ..... 28, 53
New York v. New Jersey, 256 U.S. 296 ..... 50, 53
New York City v. Pine, 185 U.S. 93 54
Nolan v. New Britain, 69 Conn. 668 46
North Dakota v. Minnesota, 263 U.S. 365 ..... 50, 53, 54
Osborn v. Norwalk, 77 Conn. 663 45
Parker v. American Woolen Co., 195 Mass. 591 ..... 42, 43, 46
Parker v. Griswold, 17 Conn. 288 ..... 43, 44
Parker v. Hotchkiss, 25 Conn. 321 43
Pennsylvania v. West Virginia, 262 U.S. 553 53
Pennsylvania v. Wheeling Bridge Co., 13 How. 518; 18 How. 421 31
Philadelphia Co. v. Stimson, 223 U.S. 605 32
Platt Bros. & Co. v. Waterbury, 72 Conn. 531 46
Richmond Screw Anchor Co. v. United States, 275 U.S. 331 29
Rickey Land & Cattle Co. v. Miller & Lux, 218 U.S. 258 53
Roach v. Sturdy, 250 Mass. 357 43
Rockeville, etc., Co. v. Koelsch, 90 Conn. 171 47
Rockport v. Elwell, 219 Mass. 287 47

Page

Sanitary District of Chicago v. United States, 266 U.S. 405 ..... 24, 25, 26, 34
South Carolina v. Georgia, 93 U.S. 4 31
Southern Pacific Co. v. Olympian Dredging Co., 260 U.S. 205 ..... 32, 34, 36
Stamford Extract Mfg. Co. v. Stamford Rolling Mills Co., 101 Conn. 310 ..... 43, 47
Stratton v. Mount Hermon Boys' School, 216 Mass. 83 ..... 42, 43, 44
Taft v. Bridgeton Worsted Co., 237 Mass. 385 42
United States v. Chandler-Dunbar Co., 229 U.S. 53 ..... 32, 34
United States v. Rio Grande &c. Co., 174 U.S. 690 22
United States v. River Rouge Improvement Co., 269 U.S. 411 38
Water Commrs. v. Perry, 69 Conn. 461 43
Watson v. New Milford Water Co., 71 Conn. 442 45
Wier v. Covell, 29 Conn. 197 44
Wisconsin v. Illinois, 270 U.S. 634 41
Wisconsin v. Illinois, 271 U.S. 650 56
Wisconsin v. Illinois and Sanitary District, 278 U.S. 367 ..... 18, 20, 23, 25, 29, 30, 39, 41, 50, 56
Wyoming v. Colorado, 259 U.S. 419 ..... 47, 51

TABLE OF AUTHORITIES CITED.

Act of September 19, 1890 34
Act of March 3, 1899, § 18 32
36 Harvard Law Review 960, "Interstate Rights in Interstate Streams in the Arid West" 47
Mass. Stat. 1926, c. 375 ..... 2, 5
Mass. Stat. 1927, c. 321 ..... 2, 5
34 Op. (U.S.) Atty. Gen. 410 ..... 19, 22
River and Harbor Act of March 3, 1899, § 9 ..... 6, 13, 16, 28
River and Harbor Act of March 3, 1899, § 10 ..... 6, 9, 13, 16, 28
Special Master's Report, Wisconsin v. Illinois 24, 25, 30
26 Stat. at L. 453 34
30 Stat. at L. 1151 ..... 6, 32
U.S. Code, Tit. 33, § 401 ..... 6, 16
U.S. Code, Tit. 33, § 403 ..... 6, 17
U.S. Code, Tit. 33, § 502 32
U.S. Const., art. III, §§ 1 and 2 15

In the

Supreme Court of the United States.

OCTOBER TERM, 1929.

No. 13, ORIGINAL.

THE STATE OF CONNECTICUT,
COMPLAINANT,

v.

THE COMMONWEALTH OF MASSACHUSETTS,
DEFENDANT.

BRIEF OF THE DEFENDANT, THE COMMONWEALTH OF MASSACHUSETTS, IN OPPOSITION TO

1. Motion for Leave to File Motion to Dismiss the Defendant's Answer;
2. Motion to Dismiss the Defendant's Answer;
3. Motion for Leave to File Motion to Strike Out Portions of the Defendant's Answer;
4. Motion to Strike Out Portions of the Defendant's Answer.

STATEMENT OF THE CASE.

This is an original bill in equity filed by leave of court by the complainant, the State of Connecticut, seeking to prevent and enjoin the defendant, the Commonwealth of Massachusetts, from diverting—

(*a*) the flood waters of the Ware river,
(*b*) certain waters of the Swift river,

both of which streams are non-navigable tributaries of the Chicopee river, itself a non-navigable tributary of the Connecticut river, and are situated wholly within the geographical limits of Massachusetts. The purpose of the proposed diversion, authorized by two acts of the General Court of Massachusetts, is to provide a suitable supply of water for drinking and domestic use for the Metropolitan Area surrounding the City of Boston, which is now threatened with a serious water shortage (Answer, pp. 23-24). The Massachusetts legislation authorizing the project is found in Acts of 1926, c. 375, and Acts of 1927, c. 321 (Answer, pp. 33-77).

Connecticut, appearing not only as a proprietor of riparian lands (Bill, p. 6), but also as *parens patriae* (Bill, pp. 2, 6, 10, 13), alleges that the diversion will seriously impair navigation upon the Connecticut river (Bill, p. 10), that it will diminish the flow of water in the river sufficiently to cause damage to the health (Bill, pp. 8, 9, 11, 12), welfare, and property interests of Connecticut and her citizens, and that it will be a violation of the riparian rights (Bill, p. 7) of the State of Connecticut and of the citizens of that State, who can be represented as against another sovereign State of the Union only by the State as *parens patriae*.

Massachusetts in an answer to the bill, filed by leave of court, denies that any injury to navigation, to the State of Connecticut, or to the citizens of that State will result from the proposed diversion, and affirmatively alleges that compared to the total flow in the Connecticut river at the Connecticut–Massachusetts boundary the flow to be diverted is negligible and insignificant (Answer, pp. 1-27). [It appears from the bill (p. 4) that the total watershed of the Connecticut river is 11,300 square miles. The total watershed of the Ware river is alleged to be 221 square miles and that of the Swift river is set forth as 213 square miles (Bill, p. 5). It appears from the answer of Massachusetts, however, that the drainage area of the Ware river

above the point of partial diversion is only 98 square miles (Answer, par. 7, p. 9) and that the drainage area of the Swift river above the point of diversion is only 186 square miles (see Answer, par. 17, p. 18, and plan opposite p. 32; Amended Answer, Appendix "C," p. 27).] Massachusetts also sets up certain affirmative legal and equitable defenses (Answer, pp. 27-32), including—

(*a*) The existence of an emergency within Massachusetts constituting a justification for a reasonable use of the waters to be taken by the proposed diversion (Answer, pp. 27-28).

(*b*) The existence of an adequate remedy at law in the State of Connecticut and its citizens in the form of compensation for any injury caused to the State or its citizens (Answer, pp. 24-25, 28-29).

(*c*) The serious injury to the welfare of the citizens of Massachusetts, if the diversion is prohibited, compared to the negligible and trivial damage to Connecticut and its citizens possibly caused if the diversion is permitted, which should lead a court of equity to give substitutional relief rather than specific relief.

(*d*) The contention that the claim of Connecticut goes beyond a claim in behalf of the State in its true capacity as *parens patriae*.

(*e*) The contention that, so far as relief is sought for interference with navigation, the matter is one delegated under due constitutional authority by the Congress of the United States to the Secretary of War and his subordinates.

(*f*) The contention that the diversion is one which is *de minimis* and in all respects a reasonable use of the waters of the Swift and Ware rivers by Massachusetts.

(*g*) Laches.

Connecticut's Unsuccessful Attempt to Join War Department Officials as Parties Respondent.

At the last term of court the State of Connecticut requested leave of this Honorable Court to file a motion which—

1. Sought to join the Chief of Engineers, United States Army, and the Secretary of War as parties respondent in this equity case.

2. Sought to obtain an injunction against these officials of the War Department—

(*a*) prohibiting them from acting upon the then pending application for a determination of the effect of the proposed diversion from the Swift river upon the navigable capacity of the navigable portion of the Connecticut river.

(*b*) ordering them to revoke their previously announced determination that (with certain insubstantial and immaterial limitations) the proposed diversion from the Ware river would have no adverse effect upon the navigable capacity of the Connecticut river.

The motion was based on allegations—

1. That the Secretary of War and the Chief of Engineers had no jurisdiction to determine that the proposed diversions would have no adverse effect on the navigation of the Connecticut river.

2. That the determination in fact made by the War Department officials was erroneous.

On April 22, 1929, this Honorable Court refused leave to Connecticut to file this motion, 279 U.S. 821.

Applications by Massachusetts to the War Department for Permission to Make the Proposed Diversions—Action thereon by the War Department.

On November 30, 1927 (Amended Answer, par. 1, p. 6; Answer, p. 6; Appendices to Amended Answer, "B" and "C," pp. 12-32), the Metropolitan District Water Supply

Commission (acting at the suggestion of the Providence District Engineer of the War Department) filed formal application for permits to make the diversions contemplated under the Massachusetts legislation (Answer, Appendix "A," pp. 33-77). After public hearings and extended investigation, during which counsel and engineers for the State of Connecticut were heard at length, the War Department, upon recommendation of the Chief of Engineers and with the approval of the Secretary of War, determined—

(*a*) on March 14, 1928, that the proposed diversion from the Ware river "will have no adverse effect on the navigable capacity of the Connecticut River" (Amended Answer, p. 7; Appendix "B" thereto, p. 16), and announced that the War Department would interpose no objection to such proposed diversion, provided that it remained within stipulated limits substantially those of the Massachusetts Acts of 1926, chapter 375, section 4 (Answer, pp. 37-38);

(*b*) on May 11, 1929, that the proposed diversion from the Swift river [if kept within certain limits, set forth in the order of the Department; which limits will result in a modification of the diversion authorized by the Massachusetts Acts of 1927, chapter 321, section 1 (see Answer, pp. 48-50)] would not substantially alter or modify the condition or navigable capacity of the channel of the navigable portion of the Connecticut river (Amended Answer, p. 7; Appendix "C," p. 29), and announced that subject to the limitations stipulated the Department would interpose no objection to the proposed diversion.

War Department approval has thus been obtained for the whole Ware river diversion contemplated by the Massachusetts legislation, with trivial and immaterial modifications; and for very much the greater part of the Swift river diversion authorized by the Massachusetts legislation. Of course, while the War Department limitations remain in effect, they will, as a practical matter, control the terms

of the diversion in so far as they are inconsistent with the Massachusetts legislation.

The Requested Amendments of the Answer.

The action of the War Department did not take place until after the filing in March, 1928, of the original answer in these equity proceedings. Certain provisions of the answer require amendment in view of these recent events. The answer as amended contains the pertinent portions of the applications to the War Department and of the orders of that Department (Appendices "B" and "C"; Amended Answer, pp. 12 to 32).

SUMMARY AND ANALYSIS OF THE PRESENT MOTIONS AND OF THE ARGUMENTS OF THE PARTIES.

The Present Motions of the Complainant.

The State of Connecticut now seeks leave to file—

(*a*) a motion to dismiss the defendant's answer.

(*b*) a motion to strike out certain portions of the defendant's answer.

THE CONNECTICUT MOTION TO DISMISS THE ANSWER.

Contentions of Connecticut in the Motion to Dismiss.

The motion to dismiss the defendant's answer is based upon the following general contentions:

1. That it appears from the face of the defendant's answer that the proposed diversion of water from the Ware and Swift rivers is forbidden under the River and Harbor Act of March 3, 1899, §§ 9 and 10 (30 STAT. AT L. 1151; U.S.C., Tit. 33, §§ 401, 403)—

(*a*) since it is alleged that it appears in the answer that the consent of Congress has not been obtained for the erection of works in the *non*-navigable streams—the Swift and the Ware rivers (Mot. to Dismiss, pars. 2-9, pp. 5-8; see, however, argument, *infra*, pp. 16 to 39).

(*b*) since it is alleged that it appears in the answer that the work in these *non*-navigable streams has not been recommended by the Chief of Engineers and authorized by the Secretary of War or that plans for such work in these *non*-navigable streams have been submitted to the Chief of Engineers and approved by the Secretary of War (Mot. to Dismiss, pars. 3, 4, 6, 7, 9, pp. 6-8; see, however, argument, *infra*, pp. 28 to 29).

2. That it appears from the answer—

(*a*) That the Massachusetts legislation contains no authorization of the taking by eminent domain of the property (situated in Connecticut) of the State of Connecticut or of its citizens.

(*b*) That no sovereign entitled to take property in Connecticut by eminent domain has—

i) taken such property,

ii) or authorized its taking.

(Mot. to Dismiss, pars. 10-13, pp. 8-9; see, however, argument, *infra*, pp. 41 to 56.)

3. That it appears from the answer the proposed diversions are unlawful—

(*a*) under the riparian law both of Massachusetts and Connecticut (Mot. to Dismiss, par. 14, pp. 9-10; see, however, argument, *infra*, pp. 42 to 49).

(*b*) and cannot be made lawful—

i) by any act or authorization of the Massachusetts Legislature or of Congress,

ii) or by the exigency and emergency existing with respect to obtaining a suitable water supply for the Metropolitan Area in and about the City of Boston (Mot. to

Dismiss, pars. 15 and 16, pp. 10-11; see, however, argument, *infra*, pp. 49 to 56).

Contentions of Massachusetts in Opposition to the Allowance of the Motion to Dismiss.

Massachusetts contends that the answer (and the amendment thereto now sought) is sufficient in law to present a complete defense to the bill of complaint. By denial of allegations of fact contained in the bill of complaint and by affirmative allegations of fact (not as yet denied in any pleading filed by the State of Connecticut) a factual basis is laid for defenses, both legal and equitable, which, we contend, this Honorable Court should find to be adequate.

The answer (and the amendments which the Commonwealth of Massachusetts now seeks to make thereto) alleges, among others, the following facts:

1. The Massachusetts project (both as authorized by the Massachusetts legislation and as modified by the terms of the War Department orders—see Answer, Appendix "A," pp. 33-77; Amended Answer, Appendices "B" and "C," pp. 12 to 32) contemplates the erection of no works, dams, or structures in any navigable stream. The only structures contemplated are to be in the non-navigable Swift and Ware rivers (see Answer, par. 14, esp. p. 12; par. 17, esp. pp. 16-19; par. 19, p. 22; par. 20, pp. 23-24). It is the contention of Massachusetts—

(*a*) That no affirmative authorization by Act of Congress is necessary for the erection of works in non-navigable streams, even if they are tributaries of navigable waters of the United States.

(*b*) That the provisions of section 9 of the River and Harbor Act are not applicable to the erection of structures in non-navigable streams—so that it is not necessary for Massachusetts to submit plans for the contemplated structures to any Federal official or department nor need the

approval of such structures by any Federal official or department be obtained (see argument, *infra*, pp. 28 to 30).

2. The Massachusetts project (as originally authorized by the Legislature and as modified by the War Department orders) will as a matter of fact—

(*a*) have no adverse effect upon the navigable capacity of the Connecticut river (Answer, par. 11, p. 10; par. 13, p. 11; par. 14, pp. 11-13; par. 16, pp. 13-15; par. 17, pp. 15-20; par. 18, pp. 20-22; Amended Answer, pars. 1, 2, 3).

(*b*) result in only a reasonable use of the waters arising in Massachusetts, which flow across the Connecticut–Massachusetts boundary, for the purpose of relieving a real emergency existing in Boston (see, *e.g.*, Answer, par. 17, esp. p. 20).

(*c*) have no tendency to injure the health, safety, welfare, or property of the State of Connecticut or its inhabitants (see, *e.g.*, Answer, par. 16, esp. p. 15).

It is the contention of Massachusetts that these facts, if proved, taken together with the findings and orders of the War Department (Amended Answer, Appendices "B" and "C," pp. 12 to 32) indicate—

(*a*) That there is no violation by Massachusetts of the provisions of section 10 of the River and Harbor Act of 1899, inasmuch as the diversion (either as originally contemplated or as modified by the War Department orders) will cause no appreciable or unreasonable alteration of the navigable capacity of the Connecticut river (see argument, *infra*, pp. 16 to 41).

(*b*) That the contemplated use by Massachusetts of the waters of the Connecticut river watershed is entirely proper and involves no taking of property situated in Connecticut; not only because of the principle of equitable division of waters of interstate streams as between equally sovereign States (see, *e.g.*, *Kansas* v. *Colorado*, 206 U.S. 46, 100; see argument, *infra*, pp. 49 to 56); but also by reason of

the principle of reasonable user as between riparian owners, which is in force both in Connecticut and in Massachusetts (see Answer, par. 17, esp. p. 20; see argument, *infra*, pp. 42 to 49).

(*c*) That every consideration of equity and of the principles of law governing interstate relations and disputes requires that Massachusetts be permitted to make the diversion contemplated without interference, at least so long as the terms of the orders of the War Department (see Amended Answer, Appendices "B" and "C," pp. 12 to 32) are not disregarded (see argument, *infra*, pp. 41 to 56).

In addition to the above contentions based upon the issues of fact raised by the allegations of fact contained in the pleadings, Massachusetts contends that this Honorable Court in its discretion ought to deny the motion to dismiss the defendant's answer (and the motion to strike out portions of the answer) until such time as it has before it for consideration definite findings of fact by a special master based on evidence heard by him. This Honorable Court, in adjudicating the issues here in dispute, is sitting as a *quasi*-international court, and it should have the benefit of a full knowledge of the factual situation before deciding any of the issues. Such procedure, we contend, would be in accordance with the usual practice of this Court (see, *e.g.*, *Kansas* v. *Colorado*, 185 U.S. 125, 146-147; *id.* 206 U.S. 46, 105; see argument, *infra*, pp. 40 to 41, 55 to 58).

THE CONNECTICUT MOTION TO STRIKE OUT CERTAIN PORTIONS OF THE MASSACHUSETTS ANSWER.

The motion to strike out is designed to eliminate from the answer filed by Massachusetts allegations of fact upon which are based certain legal and equitable defenses which Connecticut deems to be insufficient in law. Roughly, the

motion may be said to be aimed at the following groups of allegations of fact in the answer:

1. Allegations that Connecticut will not be materially damaged by the diversion, but, on the contrary, will be considerably benefited by the mitigation of the severity of floods in the river; allegations that the effect of the diversion will not be sufficiently appreciable to be capable of measurement at the Massachusetts–Connecticut boundary (Mot. to Strike Out, pars. 1, 2, 7, 10, pp. 5-8, 17-20, 27-29).

2. Allegations that Boston and the Metropolitan District about that city are confronted with a serious emergency; allegations of the expenditure to meet that emergency (Mot. to Strike Out, pars. 3, 5, pp. 8-12, 14).

3. Allegations that an adequate remedy at law exists by which Connecticut and its citizens can recover for any incidental damage possibly caused by the diversion (Mot. to Strike Out, par. 6, pp. 14-17).

4. Allegations that the proposed diversions will not in fact obstruct the navigability or the navigable capacity of the Connecticut river; allegations that the protection of the navigability of the navigable waters of the United States is a duty of Congress (and by delegation of the administrative power of Congress, a duty of the Secretary of War, the Chief of Engineers, and of the War Department) and that the issue of the effect of the proposed diversion (as modified by the War Department orders) upon navigability is not open in these proceedings (Mot. to Strike Out, par. 8, pp. 20-24).

5. Allegations that the proposed diversion (both as originally contemplated and as modified by the War Department orders) is in fact a proper exercise of the sovereign right of Massachusetts to make a reasonable use of the waters of the Connecticut river valley watershed (particularly those waters arising in Massachusetts) within the principle of the equitable division of the waters of inter-

state rivers as between States, subject only to the superior rights delegated under the Constitution to the Federal Government (Mot. to Strike Out, pars. 9, 10, 12, pp. 24-26, 28, 30).

6. Allegations that Connecticut is in fact guilty of laches (Mot. to Strike Out, par. 4, pp. 12-14).

7. Allegations that the sewage content of the waters of the Connecticut river at the point where the river passes the Connecticut–Massachusetts boundary could be greatly increased without—

(*a*) making an unreasonable riparian use of the waters of the river.

(*b*) causing any menace or damage to the health, safety, welfare, or property of the State of Connecticut or of its inhabitants (Mot. to Strike Out, par. 11, pp. 29-30).

Connecticut's Contentions of Law upon the Motion to Strike Out.

Connecticut in substance makes contentions of law—

1. That the right of Massachusetts under any conceivable circumstances is absolutely limited to a use of the water of an interstate stream without any diminution as it flows through the State; that the quality, the quantity, and the time and rate of flow cannot be varied by any act of Massachusetts. This principle, Connecticut asserts, should be enforced—

(*a*) regardless of the fundamental interests of the health, welfare, and safety of the whole people of Massachusetts.

(*b*) regardless of any principle of equitable division of the waters of interstate streams as between equal *quasi*-sovereign States.

(*c*) regardless of any necessity or emergency existing in Massachusetts.

(*d*) regardless of the fact that the effect of the contemplated interference with the flow of the Connecticut river is—

i) so small as to be incapable of measurement at the Massachusetts–Connecticut boundary.

ii) so small as to constitute (within the limits of the War Department orders) no interference with navigation upon the Connecticut river.

iii) so small as to cause no damage whatsoever to the State of Connecticut or the citizens of that State.

(*e*) regardless of any equitable principles of comparative necessity and damage or of substitutional rather than specific relief based upon the circumstances of a particular case (see Mot. to Strike Out, pp. 6, 8, 11, 16-17, 20, 28-29, 30).

(*f*) regardless of any principle of priority of right to water based on the degree of public interest in the particular use as compared with the public interest in any other potential or actual use of the same water.

2. That under the terms of sections 9 and 10 of the River and Harbor Act of 1899 (see *supra*, p. 6; *infra*, pp. 16-17) Massachusetts has not taken the proper steps to obtain an authorization from the War Department and from Congress, and that the War Department has no power to grant such authorization (Mot. to Strike Out, pp. 23-24). These contentions of law are in substance the same as are made generally upon the issue of navigability in the motion to dismiss the defendant's answer (see *supra*, pp. 6 to 7).

The Contentions of Law made by Massachusetts in Opposition to the Allowance of Leave to File and to the Allowance of the Motion to Strike Out Portions of the Answer.

Generally speaking, the contentions of Massachusetts in opposition to the motion to strike out are the same as the contentions in opposition to the motion to dismiss (see *supra*, pp. 8 to 10). Massachusetts contends that the particular portions of the answer sought to be eliminated

contain allegations of fact which, if duly supported by evidence, prove—

1. That the contemplated diversion is to be accomplished by structures placed in the waters of only *non*-navigable streams; and therefore not within the jurisdiction of the War Department.

2. That the contemplated diversion (especially as modified by the War Department orders) has no tendency to obstruct or injure the navigable capacity of the Connecticut river.

3. That the contemplated diversion will cause in fact no damage to the health, welfare, safety, or property of the State of Connecticut or of its citizens.

4. That, if the contemplated diversion is not permitted (at least within the limits approved by the War Department), serious and irreparable damage will be caused to the Metropolitan Area about and including Boston.

5. That the contemplated diversion is in fact so small as to constitute no appreciable or unreasonable interference with the flow of the Connecticut river at the point where it enters the State of Connecticut.

Upon these facts as alleged (and subject to proof thereof), Massachusetts contends that the defendant should be allowed to present evidence and that a court of equity should deny relief to Connecticut, because—

1. As a matter of law and of fact the Massachusetts project does not contemplate the creation of any forbidden or unreasonable obstruction to the navigable capacity of the Connecticut river and in view of the orders of the War Department (set out in Appendices "B" and "C," Amended Answer, pp. 12 to 32) it appears—

(*a*) that Massachusetts is erecting no unauthorized structure in any navigable water of the United States.

(*b*) that the appropriate officials of the War Department, acting within the proper scope of their authority, have found that the proposed diversion, if kept within

proper limits (which, subject to future modifications, the power to make which is duly reserved by that Department, have for the time being been determined and fixed by that Department), will not interfere with navigation.

2. As a matter of law Massachusetts is proposing to take only such portion of the flow of the Connecticut river as—

(*a*) is proper under the principle of the equitable division of the waters of interstate streams as between States.

(*b*) is proper under the principle of reasonable user as between riparian owners—the only riparian owners concerned in this case being the State of Connecticut and the Commonwealth of Massachusetts in their *quasi*-sovereign capacities.

(*c*) would give rise to no judicial relief under any circumstances under the principle *de minimis non curat lex*.

3. As a matter of the adjustment of interstate controversies under the power committed to this Honorable Court by the Constitution of the United States (Article III, sections 1 and 2) in accordance with principles of equity, of international law, and of practical fairness and necessity, this Court should—

(*a*) determine the facts before determining the law applicable to the case and should commit this case to a special master for the determination of all the pertinent facts.

(*b*) should then weigh the urgent necessity of Massachusetts against the trivial and inconsequential damage (if any) to Connecticut and frame a decree which is the considered judicial determination of the proper balance of the interests here in issue.

POINTS AND AUTHORITIES.

I.

THE ACTION OF THE SECRETARY OF WAR AND THE CHIEF OF ENGINEERS UPON THE APPLICATIONS FOR THE APPROVAL OF THE CONTEMPLATED DIVERSIONS CONSTITUTED A PROPER PERFORMANCE OF THE DUTIES DELEGATED TO THEM BY THE ACT OF CONGRESS OF MARCH 3, 1899. THAT ACTION CONSTITUTES AN AUTHORIZATION OF THE DIVERSION (WITHIN THE LIMITS SPECIFIED IN THE WAR DEPARTMENT ORDERS), SO FAR AS NAVIGATION IS CONCERNED, AND FORECLOSES ANY CONTENTION OF CONNECTICUT THAT THE DIVERSION WILL INJURE NAVIGATION, IN THE ABSENCE OF PROOF OF BAD FAITH.

A. The Duty of Determining whether Any Given Diversion of Water, which if Not Diverted will Flow into a Navigable Stream, will Constitute or Cause an Obstruction of the Navigable Capacity of that Stream Devolves upon the Secretary of War and the Chief of Engineers under the Act of March 3, 1899. No Direct Action by Congress is Necessary.

Sections 9 and 10 of the Act of March 3, 1899, 30 STAT. AT L. 1151 (U.S. Code, Tit. 33, §§ 401, 403), read as follows:

> "SEC. 9. That it shall not be lawful to construct or commence the construction of any bridge, dam, dike, or causeway over or in any port, roadstead, haven, harbor, canal, navigable river, or other navigable water of the United States until the consent of Congress to the building of such structures shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of War; *Provided*, That such structures may be built under authority of the legislature of a State across rivers and other waterways the navi-

gable portions of which lie wholly within the limits of a single State, provided the location and plans thereof are submitted to and approved by the Chief of Engineers and by the Secretary of War before construction is commenced: *And provided further*, That when plans for any bridge or other structure have been approved by the Chief of Engineers and by the Secretary of War, it shall not be lawful to deviate from such plans either before or after completion of the structure unless the modification of said plans has previously been submitted to and received the approval of the Chief of Engineers and of the Secretary of War.

"SEC. 10. That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner *to alter or modify the* course, location, condition, or *capacity of*, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, *or of the channel of any navigable water of the United States*, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same." (Italics ours.)

The Wisconsin Case.

The precise nature of the authority and duty delegated by Congress in these sections was recently considered by this Honorable Court in—

Wisconsin v. *Illinois and Sanitary District*, 278 U.S. 367, 412-413—

where it was said:

> "The policy carried out in the Act of March 3, 1899, had been begun in the Act of September 19, 1890, c. 907; 26 Stat. 454, 455. Sections 9 and 10 were the rearranged result of the provisions of Sections 7 and 10 of the Act of 1890. A new classification was made in Sections 9 and 10 of the Act of 1899, and substituted for Section 10 of the Act of 1890. The latter provided that the creation of any obstruction to navigable capacity was prohibited, unless 'affirmatively authorized by law' and this was changed so as to read 'affirmatively authorized by Congress.' The change in the words of the first clause of Section 10 was intended to make mere State authorization inadequate. *Sanitary District* v. *United States*, 266 U. S. 405, 429; *United States* v. *Bellingham Bay Boom Co.*, 176 U. S. 211. It was not intended to override the authority of the State to put its veto upon the placing of obstructing structures in navigable waters within a State and both State and Federal approval were made necessary in such case. *Cummings* v. *Chicago*, 188 U. S. 410. The words 'affirmatively authorized by Congress' should be construed in the light of the administrative exigencies which prompted the delegation of authority in the succeeding clauses. Congress, having stated in Section 9 as to what particular structures its specific consent should be required, intended to leave to the Secretary of War, acting on the recommendation of the

Chief of Engineers, the determination of what should be approved and authorized in the classes of cases described in the second and third clauses of Section 10. If the section were construed to require a special authorization by Congress whenever in any aspect it might be considered that there was an obstruction to navigable capacity, none of the undertakings specifically provided for in the second and third clauses of Section 10 could safely be undertaken without a special authorization of Congress. *We do not think this was intended.* [Italics ours.] The Supreme Court of Maine in *Maine Water Co.* v. *Knickerbocker Steam Towage Co.*, 99 Me. 473, took the same general view in construction of the same section. It held that the broad words of the first clause of that section were not intended to limit the second and third clauses and that Congress's purpose was a direct prohibition of what was forbidden by them except when affirmatively approved by the Chief of Engineers and the Secretary of War. We concur in this view.

"The true intent of the Act of Congress was that unreasonable obstructions to navigation and navigable capacity were to be prohibited, and in the cases described in the second and third clauses of Section 10, the Secretary of War, acting on the recommendation of the Chief of Engineers, was authorized to determine what in the particular cases constituted an unreasonable obstruction."

Contemporary Construction of Section 10.

The Court (at p. 413) then adverts to and approves the contemporary construction of section 10 by the War Department, especially as revealed by the Opinion of the Acting Attorney General to the Secretary of War (February 13, 1925), 34 Op. Atty. Gen. 410, 416, where the Acting Attorney General says:

"In my opinion Congress thus intended to delegate to the Chief of Engineers and the Secretary of War an administrative authority to determine a fact; and if they were of opinion that the use of navigable waters in a certain case was not such an impairment of their navigability as to require the prohibition of Congress, then the construction was 'affirmatively authorized by Congress,' because the administrative agency to which Congress had delegated the ascertainment of the facts had found the fact to be that such use was not for the time being an impairment of navigable capacity such as Congress intended to prohibit.

"I am informed that for a long period of years it has been the practice of the War Department to issue permits under section 10 of the Act of March 3, 1899, without requiring that the particular project be first authorized by special Act of Congress, and that was the policy of the War Department in the specific case of the Sanitary District of Chicago."

The following language of the opinion in *Wisconsin v. Illinois and Sanitary District* shows that the Court clearly had in mind the precise nature of the determination of fact thus left by Congress to the Secretary of War and to the Chief of Engineers (at p. 414):

"But it is said the construction thus favored would constitute it a delegation by Congress of legislative power and invalid. We do not think so. The determination of the amount that could be safely taken from the Lake is one that is shown by the evidence to be a peculiarly expert question. It is such a question as this that is naturally within the executive function that can be deputed by Congress. . . .

"The construction of Section 10 of the Act of March 3, 1899, was settled by this Court in the decision of the first Chicago Drainage Canal case in 266 U. S. 405,

429. The decision there reached and the decree entered can not be sustained, except on the theory that the Court decided first that Congress had exercised the power to prevent injury to the navigability of Lake Michigan and the other lakes and rivers in the Great Lakes watershed, and second that it could properly and validly confer the administrative function of passing on the issue of unlawful injury or otherwise on the Secretary of War, and that it had done so."

Summary of the Wisconsin Case.

Such is this Court's most recent construction of the power and duty confided to the Secretary of War and to the Chief of Engineers by section 10. Briefly, it may be summarized:

1. Congress, by section 10, has declared its decision that no unreasonable obstruction to navigable capacity shall be permitted unless Congress has affirmatively authorized it either directly or through the War Department.

2. Actual assent by Congress itself is necessary to projects covered by section 9. [In the case at bar it appears from the answer (p. 18) that the only dam or other storage reservoir to be constructed by Massachusetts as part of the project will be in the valley of the Swift river, which is in no sense a navigable water of the United States. The Connecticut river itself is not alleged to be navigable above Springfield (Bill, par. 6, p. 4). There is obviously no necessity of action by Congress itself under section 9 in order that approval of the erection of a reservoir in the valley of the Swift river may be obtained.]

3. Congress, by section 10, has delegated to the Secretary of War and to the Chief of Engineers the duty of determining whether any other project (having the necessary or probable result of doing one of the acts mentioned in the second and third clauses of section 10) is reasonable or unreasonable so far as concerns the public interest in the

maintenance of navigation for the protection of interstate and foreign commerce. A determination that a project is reasonable constitutes an affirmative authorization by Congress.

[We submit that it cannot successfully be maintained that the authority given by the second and third clauses of section 10 to the Secretary of War and to the Chief of Engineers does not include the power to determine the propriety of diversions from non-navigable tributaries of navigable waters. The third clause of section 10 (see *supra*, p. 17) reads, in part:

> ["And it shall not be lawful . . . in any manner to alter or modify the . . . capacity . . . of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

[These words are broad and inclusive in meaning and they have been liberally construed to include affecting by diversions the navigable capacity of a navigable water, as in the *Chicago Drainage Canal* cases. (See 34 Op. Atty. Gen. 410, 416.) It is obvious that a diversion from a non-navigable tributary of a navigable water may have fully as great an effect upon the navigable capacity of that water as a direct diversion from that water itself.

> [*United States* v. *Rio Grande &c. Co.*, 174 U.S. 690, 708.

[The purpose of Congress in making the prohibition contained in the first clause of section 10 would require the Secretary's authorization not only of a direct diversion from a navigable water but of an indirect diversion as well.]

Standards of Administrative Action by the Secretary of War.

The case of *Wisconsin* v. *Illinois* further defines the standards under which the Secretary and the Chief of Engineers must act in granting or withholding approval under section 10. We contend that these standards may be summarized so far as they affect diversions of water which otherwise would augment navigable waters.

(*a*) Diversions which *unreasonably* diminish the navigable capacity of navigable waters can only be authorized in furtherance of the protection and improvement of navigation.

(*b*) "The normal duty of the Secretary of War under Section 10 . . . is to maintain the navigable capacity of" (at p. 417) existing navigable waters rather than to sacrifice their capacity by diversions.

(*c*) There are certain projects having no relation to the improvement of navigation, but within the terms of the second and third clauses of section 10. If the Chief of Engineers recommends to the Secretary of War that such a project be approved on the ground that it will have no unreasonable adverse effect upon the navigable capacity of any stream, the Secretary acts within the scope of section 10 in permitting the project to be carried into effect (see *Wisconsin* v. *Illinois*, *supra*, at pp. 412 to 413; see *supra*, pp. 18-19). In approving such projects the standard upon which the Secretary's determination is based is the effect of the proposed project upon existing navigable capacity.

Analysis of War Department Permits in Drainage Cases.

The facts in the *Chicago Drainage* cases show that the War Department had in those cases consistently recognized the three principles of action just outlined. This is apparent from the action of successive Secretaries upon

applications by the Sanitary District for approval of diversions. The permits granted fall into two groups:

1. Determinations that proposed diversions would have no adverse effect on navigation.

It appears from the opinion (p. 404 *et seq.*) that the Sanitary District had in 1896, 1897, 1898, 1899, 1901, and 1903 obtained permits from the Secretary of War to divert water through the Sanitary Canal at a maximum rate under no permit greatly in excess of 4167 cubic feet per second (250,000 cu. ft. per min.). These permits were granted for a purpose clearly not very materially in aid of navigation, apparently upon the theory that such a diversion would not have any unreasonable adverse effect upon existing navigable capacity (with the possible exception of the permit of January 17, 1903, allowing a temporary additional diversion for the purpose of removing sewage deposit along the shores of a navigable water—see Special Master's Report, *Wisconsin* v. *Illinois*, p. 43). All of the permits above mentioned by their terms (see Special Master's Report, *supra*, pp. 34 to 43) show a zealous desire on the part of the Secretary to preserve existing navigable capacity, at the same time permitting such diversions as would not cause an obstruction to existing navigable capacity. In 1907 and in 1913 (see Special Master's Report, pp. 48, 60-66), in consistent pursuance of this policy of the Department, applications for further diversions were refused by the Secretary on the ground that they would impair the navigable capacity of waters already used for navigation. In *Sanitary District of Chicago* v. *United States*, 266 U.S. 405, 429, the whole course of action by the successive Secretaries was comprehensively reviewed, and not only by the language of the decision, but also by the result of it, the *rationale* of their construction of section 10 was approved (see especially p. 429) by this Court.

2. Temporary permit in aid of navigation.

The other type of permit considered in the case of *Wisconsin* v. *Illinois*, *supra*, was the temporary permit issued in 1925 (see Special Master's Report, p. 73), after the defendants in the *Sanitary District* case (266 U.S. 405) had been enjoined from diverting more than the amount actually and affirmatively permitted by the Secretary of War. The temporary permit unquestionably authorized a diversion which, if allowed to continue, might seriously damage the existing navigable capacity of the Great Lakes. It was conditioned upon removal by the Sanitary District of the cause of the excessive diversion by the construction of sewage disposal works. It rested for its validity, not upon the ground that the diversion would cause no injury to navigable capacity, but upon the ground that the diversion was affirmatively necessary to protect navigation in Chicago harbor from the deleterious effect of the sudden deposit of sewage inevitable if the preëxisting excess diversion were to be suddenly curtailed. Such a permit is in its essence separate and apart from a permit of the type granted earlier in the history of the Chicago diversions. The 1925 permit, though temporary in character, rested on the affirmative necessity of action to protect navigation; the earlier permits, like those applied for in the case at bar, were little more than evidence of a determination by the Secretary of War, acting in accordance with his duty under section 10, that the diversions authorized would not in fact impair the navigable capacity of existing waterways. This Court, upon a bill in equity brought by States actually and substantially injured by the diversion, recognized that it was inequitable that the Sanitary District should create by its own wrong a situation which gave validity to a permit from which the District received great benefit (see opinion, *Wisconsin* v. *Illinois*, *supra*, pp. 418, 420). It therefore made provision for a decree which would bring about as rapidly as possible a restoration of the preëxisting

navigable capacity of the Lakes without causing undue suffering and hardship to the people of Chicago; thus virtually doing precisely what the Secretary of War was endeavoring to do by the conditions imposed in the 1925 temporary permit.

The net result of the case of *Wisconsin* v. *Illinois* would seem to be, briefly:

1. To sustain the jurisdiction of the Secretary of War to make the determinations required of him by section 10 both—

(*a*) as to waiving objections, so far as public interest in navigation is concerned, to diversions which do not unreasonably interfere with existing navigable capacity, and—

(*b*) as to the necessity of action affirmatively in aid of navigation.

2. To protect those States, having an interest in the maintenance of navigation, in their enjoyment of previously existing navigable capacity—

(*a*) by enjoining unauthorized diversions;

(*b*) by treating as unauthorized diversions diversions originally proper (as not affecting navigation) which have been exceeded, thus creating an obstruction to navigable capacity which can be removed only by a cessation of both authorized and unauthorized diversions.

The case of *Wisconsin* v. *Illinois* has been examined here at such length only because the interpretation therein contained of section 10 is the most recent and most comprehensive yet undertaken by this Court, and we contend that the *Wisconsin* case in no way casts doubt upon the conclusion reached in the earlier case of *Sanitary District* v. *United States*, 266 U.S. 405. That case treated as duly authorized by Congress such diversions as were approved by the Secretary of War and the Chief of Engineers because of a determination that such diversions would have no adverse

effect on navigable capacity. This was the view of *Sanitary District* v. *United States*, taken by this Court in *Wisconsin* v. *Illinois*, *supra*, at page 414 (see *supra*, pp. 20-21).

War Department Action in Present Case.

The action of the War Department upon the Massachusetts applications for approval of the contemplated diversions has been fully set out above (see *supra*, pp. 4 to 6; see Amended Answer, pp. 5-8; Appendices "B" and "C," pp. 12 to 32). It must be taken as true (since there is no allegation in the complaint to the contrary) that the appropriate officials of the War Department—

1. Acted in good faith.

2. Made a reasonable, proper, and warranted finding of fact that the proposed diversion from the Ware river would have no adverse effect on navigation.

3. Made a similar finding of fact with respect to the Swift diversion (subject to the limitations contained in the finding. See Amended Answer, Appendix "C," pp. 19 to 32).

4. Acted in all respects within the scope of their duty under section 10, which was—

(*a*) to approve or waive objection to the project, though for a purpose not connected with the improvement of navigation, if the execution of the project would have no unreasonable adverse effect on navigation;

(*b*) to withhold approval if the navigable capacity of existing waterways would be unreasonably impaired by the execution of the project.

It is, of course, clearly unnecessary for the Secretary to deny permission for a present diversion which is not harmful to navigation, merely because at some future date a project in aid of navigation may require, for purposes of storage for use in seasons of low water, the water now proposed to be diverted. The Secretary is bound to look only

at the situation as it exists at the time of granting the application.

> *Louisville Bridge Co.* v. *United States*, 242 U.S. 409, 425.

This Court will not entertain an original bill seeking relief for a fanciful injury conceivably to be suffered in the distant future.

> *New York* v. *Illinois*, 274 U.S. 488, 490.
> *Florida* v. *Mellon*, 273 U.S. 12, 18.

No War Department Permit Needed for Structures in Non-Navigable Tributaries of Navigable Streams.

A large portion of the contentions upon the issue of navigability in the present Connecticut motions rests upon some theory that Massachusetts requires the permission of the War Department under sections 9 and 10 of the Act of March 3, 1899, before erecting a dam in the valley of the *non*-navigable Swift river (see, *e.g.*, Mot. to Dismiss, pars. 3, 4, 6, 7, 9, pp. 6-8; Mot. to Strike Out, par. 8, esp. pp. 23-24). Such a contention, pushed to its logical conclusion, would require the consent of Congress before the smallest mill dam could be built on the smallest stream, if that stream flowed eventually into a navigable river. This contention of Connecticut is, we submit, entirely frivolous. The plain words of section 9 ("any . . . dam, dike . . . in any . . . *navigable river or other navigable water*"—see *supra*, p. 16) and of section 10 ("or other structure in any . . . navigable river, or other water of the United States" —see *supra*, p. 17) indicate beyond any doubt that Congress intended to regulate only the erection of structures actually placed in the *navigable* portions of *navigable* streams—and in no way intended to do what it has probably no constitutional power to do, *i.e.*, to regulate the construction of works in non-navigable streams. If there were

any room for doubt as to the meaning of sections 9 and 10, we submit that this Court should be astute to adopt (as between a statutory construction which raises strong doubts as to the constitutionality of an act of Congress and another construction which renders the statute unquestionably valid) the construction which leaves no room for any holding or argument that the legislative department has exceeded its powers.

> *Richmond Screw Anchor Company* v. *United States*, 275 U.S. 331, 346.
> *Blodgett* v. *Holden*, 275 U.S. 142, 148.

This Court has made it clear that section 9 would be construed to apply only to the specific structures therein mentioned.

> *Wisconsin* v. *Illinois*, 278 U.S. 367, 412-413 (quoted *supra*, p. 18).

No structures in non-navigable streams are mentioned in section 9, so it is certain that no authorization by act of Congress is necessary before Massachusetts or any riparian owner can build a dam in the non-navigable Swift river. We submit that it is equally certain that the second clause of section 10 applies only to structures actually placed in navigable waters of the United States and that the section does not apply to any structure in a non-navigable stream. It is, of course, true that the construction of a dam in a non-navigable stream in and of itself has no necessary effect upon the navigable capacity of any navigable water into which the non-navigable stream may flow. For that reason there is no basis for Congressional control of the *erection* of dams in *non*-navigable waters. The *use* of such dams in such a way as to create an obstruction to the navigable capacity of any navigable water of the United States is, of course, subject to the Congressional control, which has been delegated by section 10 to the Secretary of War and to the Chief of Engineers.

B. The Determinations of the Secretary of War upon the Contemplated Swift and Ware Diversions Constitute a Valid Authorization of those Diversions so Far as the Question of Navigability is Concerned.

1. The correctness of the Secretary's determination cannot be reviewed, in the absence of proof of bad faith or failure to comply with applicable procedural requirements.

This Court has always held that Congress had full constitutional authority to decide what things constituted obstructions to navigation and what things did not. The cases on the subject are comprehensively reviewed in the Report of the Special Master in the case of *Wisconsin* v. *Illinois and Sanitary District* (see pp. 161 to 165). The special master summarizes his conclusions (at p. 164):

> "The question whether such an abstraction should be altogether prohibited, or the extent to which it should be permitted with regard to the interests of navigation, when and in what circumstances and in what amount a diversion of water from the lake would constitute an obstruction to navigation, are questions within the power of Congress to decide in the exercise of its control over navigable waters for the purposes of navigation. When these questions have been determined by Congress, or under its authority validly conferred, they are not open to reconsideration by the court."

When the *Wisconsin* case (278 U.S. 367) was decided by this Court, it cut under the rule of law laid down by the master, for, as we have indicated above, this Court decided, as a matter of equity between two parties (properly before the Court acting within its original jurisdiction), that one party could not be allowed, by committing a nuisance, to create a situation which made necessary a remedial permit from the Secretary of War (see *supra*, pp. 25-26). The

Secretary in 1925 was faced with a situation of fact and upon that situation made a valid determination in the interests of navigation. This Court in no sense disapproved the propriety of that determination, but held it proper. The Court, however, did order that the Sanitary District stop its inequitable conduct so that the Secretary would not be forced to a determination which would result in an impairment of existing navigable capacity on the Lakes. The finality of the Secretary's determination upon a given set of facts was, we submit, in no degree questioned, and the language of the *Wisconsin* case (especially at pp. 413-414) gives every indication that this Court approved the conclusion of the special master following earlier decisions of this Court:

1. That Congress could itself finally determine whether a diversion would obstruct navigable capacity.

2. That Congress could delegate that duty to the Secretary of War and his staff of expert subordinates, who were particularly fitted to make the determination of fact.

3. That the determination made in good faith was not subject to direct judicial review.

The earlier cases raise the problem more directly and uniformly hold that where the Secretary is acting to aid navigation, or is indicating that there is no injury to the Federal interest in the maintenance of navigation involved in a particular project, his determinations of fact have always been treated as final, by this Court, and as not subject to judicial review.

Pennsylvania v. *Wheeling Bridge Co.*, 18 How. 421, 430, as affecting s.c. 13 How. 518, 625.

South Carolina v. *Georgia*, 93 U.S. 4, 12.

Miller v. *Mayor*, 109 U.S. 385, 393, 395.

Monongahela Bridge Co. v. *United States*, 216 U.S. 177, 195.

Philadelphia Co. v. *Stimson*, 223 U.S. 605, 635, and cases there cited.

United States v. *Chandler-Dunbar Co.*, 229 U.S. 53, 64-65.

Louisville Bridge Co. v. *United States*, 242 U.S. 409.

Southern Pacific Co. v. *Olympian Dredging Co.*, 260 U.S. 205, 210, and cases cited.

The *Monongahela Bridge Co.* case is explicit upon the question. The Secretary of War (the present Chief Justice), acting under section 18 of the Act of March 3, 1899 (30 STAT. AT L. 1151, 1153, U.S. Code, Tit. 33, § 502), had ordered that the bridge there in question be so altered as to render it no longer an obstruction to navigation. A criminal information was filed stating non-compliance by the defendant company with the terms of the Secretary's order and the jury returned a verdict of guilty. By a motion in arrest of judgment the constitutionality of the Act of 1899 was contested. The motion was denied and a fine imposed. This Court upon writ of error held:

1. That the Act of March 3, 1899, laid down a (at p. 192) "general rule, applicable to all navigable waters, that free navigation should not be hampered by unreasonable obstructions . . . ; that . . . Congress charged the Secretary of War with the duty of ascertaining, in each case, . . . whether the particular bridge came within the general rule prescribed; that any other method was impracticable in view of the vast and varied interests of the Nation requiring legislation . . ."

2. That the Secretary must not act in arbitrary fashion, but must give notice and an opportunity to be heard to parties interested, and must allow a reasonable time for alterations. (Parenthetically, it may be here pointed out that there is no allegation in the bill, or in the pending motions in the case at bar, that the State of Connecticut has

not had full opportunity to present all her claims. Allegations which affirmatively show not only a comprehensive study of the whole situation by the War Department, but also that Connecticut has been heard at length by the Secretary and his subordinates at all stages of the proceedings are contained in the Amended Answer, p. 7; see also Appendices "B" and "C," pp. 12 to 32).

3. That the decision of the Secretary, made in good faith, is final to all intents and purposes and that (at p. 195)—

> "It was not for the jury to weigh the evidence and determine according to *their* judgment, as to what the necessities of navigation required, or whether the bridge was an unreasonable obstruction. The jury might have differed from the Secretary. That was immaterial; for Congress intended by its legislation to give the same force and effect to the decision of the Secretary of War that would have been accorded to direct action by it on the subject. It is for Congress, under the Constitution, to regulate the right of navigation by all appropriate means, to declare what is necessary to be done in order to free navigation from obstruction, and to prescribe the way in which the question of obstruction shall be determined. Its action in the premises cannot be revised or ignored by the courts or by juries, except that when it provides for an investigation of the facts, upon notice and after hearing, before final action is taken, the courts can see to it that Executive officers conform their action to the mode prescribed by Congress."

2. Congress having undertaken a comprehensive scheme for the protection of navigation, the whole subject-matter, so far as within the scope of existing Congressional regulation, is the exclusive concern of Congress and of the War Department, by delegation of the power of Congress.

It has frequently been held that, by the provisions of the Act of September 19, 1890 (26 STAT. AT L. 453, 454), and by the acts amending the 1890 act, Congress has assumed jurisdiction of the subject of obstructions to navigation in accordance with a policy of direct and general control over the navigable waters of the United States.

> *Southern Pacific Co.* v. *Olympian Dredging Co.*, 260 U.S. 205, 207-208.
> *Sanitary District* v. *United States*, 266 U.S. 405, 425-426, 428-429.

The 1890 act and the 1899 amendments (*supra*, pp. 17-18) are an exercise of the power to keep open and free from any obstructions to their navigation all of the navigable waters within the United States which are accessible from a State other than those States in which they lie.

> *United States* v. *Chandler-Dunbar Co.*, 229 U.S. 53, 62-65, and cases cited.
> See *Gilman* v. *Philadelphia*, 3 Wall. 713, 724.
> *Gibson* v. *United States*, 166 U.S. 269, 271.

In the *Chandler-Dunbar* case, *supra*, at p. 64, it was said:

> "So unfettered is this control of Congress over the navigable streams of the country that its judgment as to whether a construction in or over such a river is or is not an obstacle and a hindrance to navigation, is conclusive. Such judgment and determination is the exercise of legislative power in respect of a subject wholly within its control.

"In *Pennsylvania* v. *Wheeling Bridge Company*, 18 How. 421, 430, this court, upon the facts in evidence, held that a bridge over the Ohio River, constructed under an act of the State of Virginia, created an obstruction to navigation, and was a nuisance which should be removed. Before the decree was executed Congress declared the bridge a lawful structure and not an obstruction. This court thereupon refused to issue a mandate for carrying into effect its own decree, saying:

" 'Although it still may be an obstruction in fact, it is not so in the contemplation of law. We have already said, and the principle is undoubted, that the act of the legislature of Virginia conferred full authority to erect and maintain the bridge, subject to the exercise of the power of Congress to regulate the navigation of the river. That body having in the exercise of this power, regulated the navigation consistent with its perservation and continuation, the authority to maintain it would seem to be complete. That authority combines the concurrent powers of both governments, State and Federal, which, if not sufficient, certainly none can be found in our system of government.' "

The finality of the decision of the War Department officials upon the issue of obstruction, so far as direct attack upon that decision is concerned, is definitely settled by the opinions of this Honorable Court, cited *supra*, pp. 31 to 32. We contend, however, that it is equally well settled that the decision of the Department is fully as final when attacked collaterally in proceedings to which neither the Department nor the United States is a party. When the waiver or permit of the War Department is relied upon as an authorization or defense, it is, we submit, conclusive of the issue of obstruction or injury to navigation.

This is certainly true where the existence of an obstruction to navigation becomes of importance in litigation as between private parties.

> *Southern Pacific Co.* v. *Olympian Dredging Co.*, 260 U.S. 205, 207-208, 209-210, and cases cited.

We contend that no different rule applies when the determination of the War Department that no obstruction to navigation exists in any particular instance is raised in the course of litigation before this Honorable Court, within its original jurisdiction.

In *Kansas* v. *Colorado*, 206 U.S. 46, 85 *et seq.*, this Honorable Court, in considering the nature of its original jurisdiction as between States, took a distinction as between the method of determining issues over which the Federal Government had controlling power and the method of determining other justiciable issues between the States as to which this Court as a *quasi*-international tribunal had final power. So far as the issues in the case were subject to national control, the Court intimated that the action, if any, of the Federal Government within its proper constitutional sphere would be treated as of primary importance as governing the national phases of the situation.

> "Is the question one solely between the States or is the matter subject to national legislative regulation, and, if the latter, to what extent has that regulation been carried? Clearly this controversy is one of a justiciable nature. The right to the flow of a stream was one recognized at common law, for a trespass upon which a cause of action existed.
>
> "The primary question is, of course, of national control. For, if the Nation has a right to regulate the flow of the waters, we must inquire what it has done in the way of regulation. If it has done nothing the

further question will then arise, what are the respective rights of the two States in the absence of national regulation? Congress has, by virtue of the grant to it of power to regulate commerce 'among the several States,' extensive control over the highways, natural or artificial, upon which such commerce may be carried. It may prevent or remove obstructions in the natural waterways and preserve the navigability of those ways. In *United States* v. *Rio Grande Irrigation Company*, 174 U.S. 690, in which was considered the validity of the appropriation of the water of a stream by virtue of local legislation, so far as such appropriation affected the navigability of the stream, we said (p. 703):

"'Although this power of changing the common law rule as to streams within its dominion undoubtedly belongs to each State, yet two limitations must be recognized: First, that in the absence of specific authority from Congress a State cannot by its legislation destroy the right of the United States, as the owner of lands bordering on a stream, to the continued flow of its waters; so far at least as may be necessary for the beneficial uses of the Government property. Second, that it is limited by the superior power of the General Government to secure the uninterrupted navigability of all navigable streams within the limits of the United States.

"'In other words, the jurisdiction of the General Government over interstate commerce and its natural highways vests in that Government the right to take all needed measures to preserve the navigability of the navigable watercourses of the country even against any state action.'"

See also *Missouri* v. *Illinois*, 200 U.S. 496, 520.

We submit that the quoted reasoning in *Kansas* v. *Colorado* indicates that this Court in the exercise of its

original jurisdiction would give effect to a determination by the appropriate department of the Federal Government of an issue over which Congress had assumed to exercise the powers delegated to it under the Constitution. In the case at bar, therefore, it would follow that the determination by Congress (through its properly created administrative agents in the War Department, see *supra*, pp. 16 to 28) that the proposed Ware and Swift diversions will not obstruct navigation should be regarded in this controversy as conclusive, so far as the issue of the effect of the diversions upon navigation is concerned.

C. Only the Navigability Issue is Concluded by the War Department Orders.

Massachusetts does not contend that this Court has not full jurisdiction to determine what the effect of the proposed diversions will be upon interests other than interests of navigation of the State of Connecticut and its citizens. Congress (and its administrative agents, the Secretary of War and the Chief of Engineers) only have power to determine what the effect of the proposed diversions will be upon navigation.

> See *United States* v. *River Rouge Improvement Co.*, 269 U.S. 411, 419, and cases cited.

It by no means necessarily follows that a diversion which is innocuous so far as navigation is concerned may not cause damage to other important interests—*e.g.*, health, soil fertility, development of power, etc. We contend, however, that the diversions contemplated will have no adverse effect upon any interest of the State of Connecticut either as a proprietor or as *parens patriae*, or upon the inhabitants of Connecticut. The answer—

(*a*) by denying injury in fact to Connecticut or its inhabitants (see *supra*, pp. 8-9);

(*b*) by alleging that the proposed diversions will in fact constitute a reasonable user by Massachusetts of the waters of the Connecticut river valley (see *supra*, pp. 9-10)—

properly raises issues of fact for this Court to decide; issues which have no national aspect (see *Kansas* v. *Colorado*, 206 U.S. 46, 85) and which are admittedly properly justiciable within the type of cases over which this Court as a *quasi*-international tribunal has final power. See *Kansas* v. *Colorado*, 206 U.S. 46, 95-96 *et seq.* (see *supra*, p. 36). See also *Wisconsin* v. *Illinois*, 278 U.S. 367, 409, and cases cited.

D. The Certain Benefit in Fact to the Navigability of the Connecticut River as the Result of the Storage of Water in the Swift River Valley (particularly as Modified by the War Department Orders) Strengthens the Necessity of Giving to the War Department Orders Conclusive Effect upon the Issue of Navigability.

The Commonwealth of Massachusetts will endeavor to prove that the limitations placed upon the diversions, both by the Massachusetts legislation and by the approval granted by the War Department, will cause an increased flow in the Connecticut river during dry seasons, when water is most needed for purposes of navigation (and incidentally for purposes of dilution of sewerage), over and above the flow which would normally occur. This will result from the release of stored waters in excess of the actual flow in the Swift river on a considerable number of days each summer (see Answer, pars. 14, 16, 17, pp. 11, 12, 15, 19; Amended Answer, pars. 2, 3, pp. 9, 10; Appendix "C," esp. at pp. 29-30).

The augmented flow in the Connecticut river thus required by the War Department is a flow which would not occur except for the Massachusetts project. It is a flow furnished, at the expense of Massachusetts, in aid of navi-

gation, in the nature of compensation for a flow taken during flood seasons, which is of no use (and indeed often a positive harm) to navigation and to the riparian owners of Connecticut land.

The action of the War Department in approving the project (with modifications) can thus be said not only to be a waiver of all objection to the project from the standpoint of the Federal interest in the maintenance of navigation, but also to be a positive authorization of a project to some extent of material assistance to navigation. The action of the War Department should thus, because of the determination that the project is to some extent of benefit to navigation, be given conclusive effect here so far as the issue of navigability is raised by the pleadings.

E. The Allegations both of the Original and of the Amended Answer Deny that Any Injury to Navigation is Caused by the Project. Issues of Fact are thus Raised which are Appropriate for Consideration by a Special Master Appointed by this Court; Provided that this Court should Deem it Proper, Notwithstanding the Action of the War Department, to Consider the Issue of the Effect of the Project upon Navigation.

Although Massachusetts contends that the finding of the War Department as to the effect of the project upon navigation is conclusive in this case upon that issue, it has none the less denied that the proposed diversion (either as originally contemplated or as limited by the terms of the War Department orders) will in any way adversely affect navigation (Answer, pars. 14, 16, 17, 20, pp. 11, 14-15, 18, 22; Amended Answer, pars. 2-3, pp. 9, 10). In the event that this Court in its discretion should determine that it should not dispose of the issue of navigability upon preliminary motions (such as the present motions of Connecticut raising questions of law solely upon technical admissions of

fact made by motions in the nature of demurrers to the answer), it is submitted that the defendant's answer as amended raises sufficient issues of fact upon the question of navigability to make it proper for this Court to submit the case to a special master for the purpose of obtaining adequate findings of fact in accordance with its usual custom.

See, *e.g.*, *Kansas* v. *Colorado*, 185 U.S. 125, esp. 146-147; 206 U.S. 46, esp. 99-100 *et seq.*
Wisconsin v. *Illinois*, 270 U.S. 634; 278 U.S. 367, 370.

II.

UPON THE ISSUES RAISED BY THE ANSWER, MASSACHUSETTS ALLEGES FACTS WHICH, IF PROVED, CONSTITUTE A FULL AND ADEQUATE DEFENSE TO THE BILL OF COMPLAINT. THE MOTIONS TO DISMISS AND TO STRIKE OUT THE ANSWER SHOULD BE DENIED AND THE CASE SHOULD BE COMMITTED TO A SPECIAL MASTER.

A. As a Matter of Law the Facts Alleged in the Answer, if Taken to be True, Constitute a Full Defense to the Bill, and Specific Equitable Relief should be Denied.

The contentions of Connecticut upon the present motions fall roughly into three groups (see analyses, *supra*, pp. 6 to 8, 12-13):

1. Contentions as to the legality of the proposed diversion so far as concerns the public interest in the maintenance of navigation. These contentions have been answered, *supra*, pp. 16 to 41.

2. Contentions that the proposed diversion, or any similar diversion regardless of its extent, would be illegal as involving an invasion of the sovereign rights of Connecticut under riparian law and under the *quasi*-international law applied in interstate disputes by this Court.

3. Contentions that the facts set up in the answer which tend to show that Connecticut is not damaged and that Boston is facing a severe emergency are immaterial and that such facts cannot properly be considered by this Court even as the basis of equitable defenses.

1. Under the riparian law in force both in Massachusetts and in Connecticut a riparian owner is entitled to make a reasonable use of the waters flowing past his land, having due regard for the interests of upper and lower riparian owners upon the same stream.

The general common-law rule as to the rights of riparian owners, as in force in Massachusetts, has been stated as follows:

> "The right of each riparian owner is to have the natural flow of the stream come to his land and to make a reasonable and just use of it as it flows through his land, subject, however, to the like right of each upper proprietor to make a reasonable and just use of the water on its course through his land and subject further to the obligation to lower proprietors to permit the water to pass away from his estate unaffected except by such consequences as follow from reasonable and just use by him."

Stratton v. *Mount Hermon Boys' School*, 216 Mass. 83, 85 (see cases cited).

See *Taft* v. *Bridgeton Worsted Co.*, 237 Mass. 385, 388.

Collins Mfg. Co. v. *Wickwire Co.*, 14 Fed. (2d) 871, 872.

Parker v. *American Woolen Co.*, 195 Mass. 591, 598-599.

Mason v. *Whitney*, 193 Mass. 152, 158.

McNamara v. *Taft*, 196 Mass. 597, 599.

Isbell v. *Greylock Mills*, 231 Mass. 233, 236.
Parker v. *Griswold*, 17 Conn. 288, 299.
Stamford Extract Mfg. Co. v. *Stamford Rolling Mills Co.*, 101 Conn. 310, 320.
Buddington v. *Bradley*, 10 Conn. 212.

What constitutes a reasonable use is purely a question of fact, involving an application of the legal principle above stated to the situation presented before the Court.

Elliot v. *Fitchburg R.R.*, 10 Cush. 191, 195.
Mason v. *Whitney*, *supra*.
Parker v. *American Woolen Co.*, *supra*.
McNamara v. *Taft*, *supra*, at p. 599.
Roach v. *Sturdy*, 250 Mass. 357, 358-359.
Hazard Powder Co. v. *Somersville Mfg. Co.*, 78 Conn. 171.
Keeney & Wood Mfg. Co. v. *Union Mfg. Co.*, 39 Conn. 576 (criteria as to reasonable use of water by a mill).
Water Commrs. v. *Perry*, 69 Conn. 461, esp. 467.
Donnelly Brick Co. v. *New Britain*, 106 Conn. 167; 137 Atl. 745.
Gillett v. *Johnson*, 30 Conn. 180.
Parker v. *Hotchkiss*, 25 Conn. 321, 330.

It is undisputed, both in Connecticut and Massachusetts, that diversion of water of a stream for use upon riparian property within the same watershed is entirely proper if it constitutes as a matter of fact a reasonable use of the waters of the stream by the riparian owner.

Stratton v. *Mount Hermon Boys' School*, *supra*.
Hittinger Fruit Co. v. *Cambridge*, 218 Mass. 220 (percolating waters).

Isbell v. *Greylock Mills,* 231 Mass. 233 (where relief was denied).

Keeney & Wood Mfg. Co. v. *Union Mfg. Co.,* 39 Conn. 576, 582 (where diversion and mill use are compared).

Gillett v. *Johnson,* 30 Conn. 180, 183 (diversion of a small stream for purposes of irrigation).

Parker v. *Griswold,* 17 Conn. 288, 297 *et seq.*

See *Wier* v. *Covell,* 29 Conn. 197 (where the decision is based in part upon conveyances there involved).

As to a diversion outside the watershed, the Massachusetts cases are clearly to the effect that use of water outside the watershed is proper if in fact the use in the particular case constitutes a reasonable use of the waters of the stream in such a way as to cause no material damage to the interests of lower riparian owners. Unless there is actual or perceptible damage to a lower riparian owner, not even nominal damages will be awarded upon his bringing an action of tort based upon the diversion.

Elliot v. *Fitchburg R.R.,* 10 Cush. 191.

Stratton v. *Mount Hermon Boys' School,* 216 Mass. 83, 85.

Upon the same principle, specific relief in equity will be denied to a complainant who cannot show that the diversion which he seeks to enjoin has caused actual damage to his right to make a reasonable use of a stream.

Isbell v. *Greylock Mills,* 231 Mass. 233, 236.

The Connecticut cases upon the reasonableness of a diversion of water from the watershed by a riparian owner are by no means as clear as the Massachusetts cases. In

most of the decided cases the diversion complained of was in any event an unreasonable use of the water under the particular circumstances involved, so the question decided in Massachusetts in the case of *Stratton* v. *Mount Hermon Boys' School*, 216 Mass. 83, has not been squarely ruled upon in Connecticut, although the privilege of making a diversion to another watershed is not regarded as an ordinary incident of riparian ownership.

See, *e.g.*, *Osborn* v. *Norwalk*, 77 Conn. 663, 664-665.
Harding v. *Stamford Water Co.*, 41 Conn. 87, 91 *et seq.*

The Connecticut rule probably differs from the rule established in Massachusetts by the *Stratton* case in one particular. A lower riparian owner seems to be entitled to nominal damages even if the infringement of his riparian interests by a diversion to another watershed is of the most trivial sort possible. However, the courts of Connecticut apparently will not award substantial damages for such a diversion, nor will they enjoin such a diversion unless the complainant has suffered substantial damage because of the diversion. Apparently due weight is given to considerations of comparative damage and to facts constituting a basis for giving substitutional relief by way of damages rather than specific relief in the form of an injunction.

Watson v. *New Milford Water Co.*, 71 Conn. 442, 450.
Cf. Harding v. *Stamford Water Co.*, 41 Conn. 87, 95.
Balf Co. v. *Hartford Electric Light Co.*, 106 Conn. 315.

In the case last cited an injunction was denied upon the condition that compensation be paid to the complainants for the damage caused by the diversion.

In substance, we submit, the rule in Connecticut is fully as liberal with respect to reasonable but permanent diversions from the watershed as that laid down in the *Stratton* case for Massachusetts. That Connecticut permits the diversion of water from the watershed for use as a domestic water supply under state or municipal control is apparent from the cases cited. Due compensation for actual damage caused by the diversion must, of course, be paid.

See also *Beckerle* v. *Danbury*, 80 Conn. 124, 127.

It would seem that the Connecticut courts in a proper case would give due consideration to the amelioration of damage by compensation in kind by augmenting the flow of the diverted stream in dry seasons.

Harding v. *Stamford Water Co.*, 41 Conn. 87, 93.

The rule of reasonable user in the light of the circumstances in each particular case also extends to analogous matters, such as pollution.

Parker v. *American Woolen Co.*, 195 Mass. 591.
McNamara v. *Taft*, 196 Mass. 597.
Collins Mfg. Co. v. *Wickwire Co.*, 14 Fed. (2d) 871.
Merrifield v. *Lombard*, 13 Allen 16.
Harris v. *Mackintosh*, 133 Mass. 228.
Martin v. *Gleason*, 139 Mass. 183.
Nolan v. *New Britain*, 69 Conn. 668.
Platt Bros. & Co. v. *Waterbury*, 72 Conn. 531.
Lawton v. *Herrick*, 83 Conn. 417, 425.
Morgan v. *Danbury*, 67 Conn. 484.
See *Donnelly Brick Co.* v. *New Britain*, 106 Conn. 167, and cases cited.

See also *Rockport* v. *Elwell*, 219 Mass. 287.
Ingraham v. *Dunnell*, 5 Met. 118 (where apparently damages were held to be adequate).
Brookline v. *Mackintosh*, 133 Mass. 215.
Stamford Extract Mfg. Co. v. *Stamford Rolling Mills Co.*, 101 Conn. 310.
Rockeville, etc., Co., v. *Koelsch*, 90 Conn. 171.
Cf. DeWitt v. *Bissell*, 77 Conn. 530.

This examination of the law of riparian rights in force in Massachusetts and in Connecticut has been made because of the fact that this Court, in the exercise of its original jurisdiction of controversies between States, gives some consideration (though far from conclusive weight) to the rules of law which would govern the controversy if it were pending between private parties in the courts of either State.

See *Kansas* v. *Colorado*, 185 U.S. 125, 146-147; 206 U.S. 46, 96 *et seq.*
Wyoming v. *Colorado*, 259 U.S. 419, 466.
See *L. Ward Bannister*, "*Interstate Rights in Interstate Streams in the Arid West*," 36 *Harvard Law Review* 960.

There is ample authority to the effect that the local law in force in either State is not conclusive, when this Court is acting in its *quasi*-international capacity.

See, *e.g.*, Mr. Justice *Holmes* in *Missouri* v. *Illinois*, 200 U.S. 496, 519-520:

> "The Constitution extends the judicial power of the United States to controversies between two or more States and between a State and citizens of another State, and gives this court original jurisdiction in cases in which a State shall be a party. Therefore, if one State raises a controversy with another, this court must determine whether there is any principle of law

and, if any, what, on which the plaintiff can recover. But the fact that this court must decide does not mean, of course, that it takes the place of a legislature. Some principles it must have power to declare. For instance, when a dispute arises about boundaries, this court must determine the line, and in doing so must be governed by rules explicitly or implicitly recognized. *Rhode Island* v. *Massachusetts*, 12 Pet. 657, 737. It must follow and apply those rules, even if legislation of one or both of the States seems to stand in the way. *But the words of the Constitution would be a narrow ground upon which to construct and apply to the relations between States the same system of municipal law in all its details which would be applied between individuals.* If we suppose a case which did not fall within the power of Congress to regulate, the result of a declaration of rights by this court would be the establishment of a rule which would be irrevocable by any power except that of this court to reverse its own decision, an amendment of the Constitution, or possibly an agreement between the States sanctioned by the legislature of the United States." (Italics ours.)

So far as the local law of Connecticut and of Massachusetts is here of importance, we submit that it lays down a principle of reasonable user as between riparian owners—a principle of equality of right and opportunity limited only by the obligation not to inflict serious and substantial injury on others equally entitled. It further appears that both States lay some emphasis on the doctrine that specific relief can only be grounded on serious injury to the complainant by the diversion, and even if serious injury appears, serious consideration will be given by the courts to equitable considerations of expediency and comparative damage.

Regarding both States engaged in the present controversy as riparian owners on a large scale, we submit that there are issues of fact adequately raised by the pleadings (particularly the allegations of the answer) as to the reasonableness of the Massachusetts project and as to the trivial nature of the alleged injury (if any) to Connecticut. The existence of these issues of fact forecloses any present disposition of this case upon motions in the nature of demurrers to the answer. The allegations of reasonableness in the Massachusetts answer must, for the purpose of these motions, be taken to be true. Under the local law of both States, we submit that, if it be taken as true that the Massachusetts diversion will be in fact reasonable and that Connecticut will not be appreciably injured by it, not only would Connecticut be barred from specific relief by way of injunction but she would also be barred from more than nominal damages. It is obvious also, if the contemplated use of water by Massachusetts is in fact a reasonable use of the waters of the Connecticut river valley, that Massachusetts under the local law of water rights is taking no property of Connecticut or of its citizens. Thus upon this factual hypothesis no question of the exercise of the right of eminent domain by one State over land in another State is here presented. The case requires findings of fact by a master and the present motions to dismiss and to strike out should be denied.

2. Upon the allegations of fact contained in the defendant's answer, as amended, under the law applied by this Honorable Court in litigation as between States of the Union, Connecticut would not be entitled to relief in equity.

It is not disputed by Massachusetts that Connecticut has a standing as *parens patriae* to raise for the determination of this Court issues (other than issues concerning navigability) with respect to the effect of the proposed Massachusetts diversions. This right of the State to sue in behalf of

its own proprietary interests and the general welfare of its people is established by many decisions of this Court.

> *Kansas* v. *Colorado*, 185 U.S. 125, 141 *et seq.*; 206 U.S. 46, 80 *et seq.*
>
> *Missouri* v. *Illinois*, 180 U.S. 208, 241; 200 U.S. 496, 519.
>
> *New York* v. *New Jersey*, 256 U.S. 296, 302.
>
> *North Dakota* v. *Minnesota*, 263 U.S. 365, 372 *et seq.*
>
> *Wisconsin* v. *Illinois*, 278 U.S. 367, 409, and cases cited.

This Court not only has not consistently applied the law of any particular jurisdiction to interstate controversies involving the use of water of interstate streams, but it has studiously avoided tying its hands for the future by more than a determination of the guiding principle applicable to the case before it upon the particular facts actually before it for consideration. The doctrine of the decisions is perhaps best expressed in the language of Mr. Chief Justice *Fuller* in *Kansas* v. *Colorado*, 185 U.S. 125, at pp. 146-147:

> "Sitting, as it were, as an international, as well as a domestic tribunal, we apply Federal law, state law, and international law, as the exigencies of the particular case may demand, and we are unwilling, in this case, to proceed on the mere technical admissions made by the demurrer."

This Court has recognized that an interstate controversy of this nature "rises . . . above a mere question of local private right and involves a matter of state interest, and must be considered from that standpoint" (Mr. Justice *Brewer* in *Kansas* v. *Colorado*, 206 U.S. 46, at 99). In the case last cited the Court goes on, at page 100, to discuss the situation before it as it would be if involving solely individual riparian proprietors. In that case the Court said:

"The question would be one of legal right, narrowed to place, amount of flow and freedom from pollution.

"We do not intimate that entirely different considerations obtain in a controversy between two States. Colorado could not be upheld in appropriating the entire flow of the Arkansas River, on the ground that it is willing to give, and does give, to Kansas something else which may be considered of equal value. That would be equivalent to this court's making a contract between the two States, and that it is not authorized to do. But we are justified in looking at the question not narrowly and solely as to the amount of the flow in the channel of the Arkansas River, inquiring merely whether any portion thereof is appropriated by Colorado, but we may properly consider what, in case a portion of that flow is appropriated by Colorado, are the effects of such appropriation upon Kansas territory."

This language, together with other language found at pages 96-97 of the same opinion, shows the breadth of view taken by this Court when deciding important interstate disputes, which, in the case of completely independent sovereign States, would be settled either by diplomacy or by resort to war. It is, of course, true that the law of the States involved is given great weight by this Court in such disputes.

See, *e.g.*, *Wyoming* v. *Colorado*, 259 U.S. 419, 458, 464 *et seq.* (see *supra*, p. 47).
Kansas v. *Colorado*, 206 U.S. 46, 94.

That the local law is not given conclusive weight is well established.

See, *e.g.*, *Missouri* v. *Illinois*, 200 U.S. 496, 519-522 (quoted in part *supra*, pp. 47-48).

It is clear from the language of the decision in the above case, at page 521, that this Court will examine not only technical rules of law in force in each of the States, but also prevailing practice as to the use of streams in the communities affected by the controversy. See, for example, the following language of Mr. Justice *Holmes*, at pages 521-522:

> "As to the principle to be laid down the caution necessary is manifest. It is a question of the first magnitude whether the destiny of the great rivers is to be the sewers of the cities along their banks or to be protected against everything which threatens their purity. To decide the whole matter at one blow by an irrevocable fiat would be at least premature. If we are to judge by what the plaintiff itself permits, the discharge of sewage into the Mississippi by cities and towns is to be expected. We believe that the practice of discharging into the river is general along its banks, except where the levees of Louisiana have led to a different course. The argument for the plaintiff asserts it to be proper within certain limits. These are facts to be considered. Even in cases between individuals some consideration is given to the practical course of events. In the black country of England parties would not be expected to stand upon extreme rights. *St. Helen's Smelting Co.* v. *Tipping*, 11 H. L. C. 642. See *Boston Ferrule Co.* v. *Hills*, 159 Massachusetts, 147, 150. Where, as here, the plaintiff has sovereign powers and deliberately permits discharges similar to those of which it complains, it not only offers a standard to which the defendant has the right to appeal, but, as some of those discharges are above the intake of St. Louis, it warrants the defendant in demanding the strictest proof that the plaintiff's own conduct does not produce the result, or at least so conduce to it

that courts should not be curious to apportion the blame."

It is well settled that this Court, in exercising its original jurisdiction between States, requires that the complainant State prove that the injury which is the basis of its proceeding is a real and substantial injury causing serious damage to the complainant. It is generally stated that in order to obtain equitable relief in a suit between two States of the Union far greater damage to the interests of the complainant State must be shown than must be proved by the complainant in the case of a controversy between two private individuals.

Missouri v. *Illinois*, 200 U.S. 496, 521.
New York v. *New Jersey*, 256 U.S. 296, 309.
North Dakota v. *Minnesota*, 263 U.S. 365, 374.

The doctrine of the cases just cited is supplemented by the doctrine that a State will not be entitled to relief in a case brought under the original jurisdiction of this Court unless it can show that a present and substantial interest is affected by the injury complained of.

New York v. *Illinois*, 274 U.S. 488, esp. at 490.
New Jersey v. *Sargent*, 269 U.S. 328.
Cf. Pennsylvania v. *West Virginia*, 262 U.S. 553, 593.

The elastic nature of the law applicable to these interstate water disputes is well indicated by the following language of Mr. Justice *Holmes* in *Rickey Land & Cattle Co.* v. *Miller & Lux*, 218 U.S. 258, at 261:

"It is conceivable, to be sure, that the decisions of this court may determine that the States have rights as against each other *in invitum* in streams that flow through the land of both. *Kansas* v. *Colorado*, 206

U.S. 46, 84. *Missouri* v. *Illinois*, 200 U.S. 496, 519, 520. These rights may vary according to the system of law required by natural conditions. They may be more or less analogous to common law rights between upper and lower proprietors, where irrigation is not necessary, as in most of the older States. See *New York* v. *Pine*, 185 U.S. 93, 96. There may be some, perhaps limited, right of appropriation in the upper State, at least in the watershed of the stream, where irrigation is the condition of using the land. See *Kansas* v. *Colorado*, 206 U.S. 46, 100-104, 117. But whatever this court may decide, if a private owner should derive advantage from such a decision it would not be in his own right, but by reason of and subordinate to the rights of his State, and those rights, the petitioner insists, can, or at least should be, determined only in a suit brought by the State itself."

It is, of course, true, as indicated in the last sentence of the quotation just above, that this Court will not grant equitable relief to one State against another where the complainant State is suing purely on behalf of its individual inhabitants. The interest sought to be protected by the complainant State must, of course, be an interest so general in its scope that its protection is a duty of the complainant State as *parens patriae*.

See *North Dakota* v. *Minnesota*, 263 U.S. 365, at p. 375 *et seq.*

In a case very similar to the cases which ordinarily come to this Court in the exercise of its original jurisdiction between States, this Court gave great weight to facts which gave a basis for equitable defenses,—in the particular case that of laches,—as a reason for granting substitutional rather than specific relief.

New York City v. *Pine*, 185 U.S. 93.

It is submitted that even more attention to any such facts, as for example that the use complained of was for a municipal and domestic water supply, which tended to make substitutional rather than specific relief proper, would be given in a suit by one State against another State than in a case merely involving a controversy between two individuals.

The general principles summarized above applicable to cases brought by one State against another before this Honorable Court are very broad and depend to a large extent upon the facts of each particular case, as viewed in the light of the whole situation in the community in which the controversy arises. This Court has established in the cases involving what might be called interstate riparian ownership a doctrine of equality of right to the economic benefits arising from the presence of an interstate river as a natural resource of two or more States. That equality of benefit is, under the decisions of this Court, to be allocated as among the interested States in due proportion by the application of standards varying with the facts in the particular case.

No case has yet been decided by this Court which involves precisely the situation involved in the case at bar. *Kansas* v. *Colorado* was a suit between two States, one of which had a local riparian law based on a mere modification of the common law of riparian rights. The other State (Colorado) was subject to the western appropriation theory of riparian rights. In that case it was held that Kansas could not complain if a broad and equitable application of the doctrine of reasonable user at the common law were applied in the then pending controversy.

In the case at bar both contestants are subject to the common law of riparian rights with its attendant freedom and elasticity of application based upon the rule of reason in the light of the surrounding circumstances. Clearly, it cannot be said, in the light of the reasoning of the decided cases,

that as a matter of law the facts set up in the answer are insufficient as a defense. The whole controversy is one which by its very nature demands a careful study of the factual situation out of which the controversy arises, and we submit that the pending Connecticut motions seeking to raise pure issues of law upon the basis of technical admissions (by motions in the nature of a demurrer) should be denied, perhaps without prejudice, and that a special master should be appointed by this Court with all the power and authority to inquire into the facts in behalf of the Court that were given to the special master appointed in the still pending litigation between the Great Lakes States and the State of Illinois with respect to the diversion of water from Lake Michigan.

See *Wisconsin* v. *Illinois*, 278 U.S. 367, 370; s.c. 271 U.S. 650.
See also discussion *supra*, pp. 40-41.

B. As a Matter of Discretion, this Honorable Court should Deny the Motions of Connecticut and should Commit this Case to a Special Master for Findings of Fact.

We have argued above (*supra*, pp. 41 to 56) that the facts alleged or admitted in the defendant's answer are sufficient as a matter of law to constitute a defense to the Connecticut bill. We submit that we have shown (*supra*, pp. 49 to 56) how much this Court has been accustomed to rest its determination of the principles of law applicable to an interstate water dispute upon the facts revealed by the particular case. The facts not only are the basis for the application of established legal principles by this Court, but to some extent the facts determine the legal principles to be applied and enter into the creation of new rules of law developed for the determination of the pending case alone. It is apparent, therefore, that the definite ascertainment of the facts pertinent to the pending controversy is a

A. Ware river below Point of Diversion.

B. Swift river 1 mile below Point of Diversion.

Note: Of course no diversion has in fact taken place as yet. The project will not take effect at all until 1931 (Answer, par. 19, p. 23).

C. The Connecticut river from slightly below the Massachusetts–Connecticut State line.

D. The Connecticut river looking upstream from the Massachusetts–Connecticut State line.

necessary condition precedent to the determination of the principles of law by which the case is to be decided. Obviously, motions are premature which seek to have allegations of fact in the answer (necessarily general because of the magnitude of the project involved) stricken out and dismissed as inadequate to constitute a defense in law or in equity, when those facts are established as admitted solely in a very technical sense for the purposes of the motions.

It is, of course, necessary that the allegations of the answer as to the reasonableness of the contemplated diversions be couched in general terms. Before these allegations really can mean anything to this Court, sitting as a *quasi*-international tribunal, they must be expanded, explained, analyzed, and tested by some competent trier of the fact who can examine the whole project in the light of the background of local custom and economic practice and as affected by local law and public necessity. Attached hereto (opposite p. 56) are four photographs to serve as a graphic illustration of our argument that as a matter of policy this Court should have all the facts before it before determining any questions of law going to the root of the whole controversy. The two pictures marked "A" and "B" on page A show the Ware river and the Swift river, respectively, at or near the point of diversion. The two pictures marked "C" and "D" on page B show the Connecticut river at or near the point where the river crosses the boundary between Connecticut and Massachusetts. An examination of these pictures immediately brings to mind a large number of questions of fact that this Court would insist on having answered before determining this important cause. How much of the flow shown in the Ware and in the Swift rivers will be taken under the Massachusetts plans? Is this a fairly representative wet or dry season flow? What is the usage of the community through which these streams flow as to diversions? storage? regulation of flow? disposal

of liquid industrial waste? What proportion of the flow shown in the Connecticut river comes from the flow shown in the Ware and Swift rivers? What relation does experience show exists between the flow of the Connecticut river, both at Hartford and at the state boundary, and the flow of the Swift river and the Ware river? How does the change of tide and wind affect that relation? Would any diversion in fact be permitted under the terms of the War Department orders when a condition of stream flow existed as shown in these pictures? All these questions and many more must be answered before the issue of the reasonableness of the Massachusetts project can properly be determined. We do not offer these photographs as having any evidential value. They are submitted purely as a chalk to emphasize our argument that this case involves primarily questions of fact. After those questions have been decided, issues of law will arise. Before those questions are decided, any attempt to dispose of issues of law or of issues of mixed fact and law is premature.

We submit that in the exercise of a sound judicial discretion the Connecticut motions should be denied and the cause committed to a special master.

Respectfully submitted,
THE COMMONWEALTH OF
MASSACHUSETTS,
By JOSEPH E. WARNER,
Attorney General,
BENTLEY W. WARREN,
Special Assistant Attorney General,
GERALD J. CALLAHAN,
Assistant Attorney General,
R. AMMI CUTTER,
Assistant Attorney General.

FILE COPY

JAN 20 1930

In the

Supreme Court of the United States.

OCTOBER TERM, 1929.

No. 12, ORIGINAL.

THE STATE OF CONNECTICUT,
COMPLAINANT,

v.

THE COMMONWEALTH OF MASSACHUSETTS,
DEFENDANT.

SUBSTITUTE BRIEF OF MASSACHUSETTS, IN OPPOSITION TO

1. Motion to Dismiss the Defendant's Answer;
2. Motion to Strike Out Portions of the Defendant's Answer.

JOSEPH E. WARNER,
Attorney General of Massachusetts.
BENTLEY W. WARREN,
Special Assistant Attorney General.
GERALD J. CALLAHAN,
Assistant Attorney General,
R. AMMI CUTTER,
Assistant Attorney General.

Of Counsel:
MANLEY O. HUDSON.

ADDISON C. GETCHELL & SON, LAW PRINTERS, BOSTON.

SUBJECT INDEX.

	Page
STATEMENT OF THE CASE	1-10
Analysis of Massachusetts answer	2
Connecticut's unsuccessful attempt to join War Department officials as parties respondent	4
Applications by Massachusetts to the War Department for permission to make the proposed diversions—Action thereon by the War Department	5
The amendments of the answer	7
SUMMARY AND ANALYSIS OF THE PRESENT MOTIONS AND OF THE ARGUMENTS OF THE PARTIES	7-10
The present motions of the complainant	7
1. Connecticut contentions relating to navigation	7
2. Connecticut contentions relating to the alleged riparian rights of Connecticut and her citizens and to the alleged taking of those rights	8
3. Connecticut contentions that facts alleged in answer are immaterial so far as they form basis for equitable defenses, or for the application of equitable principles of denial of specific relief	9
POINTS AND AUTHORITIES	10-90
Summary of argument	10
I. The action of the Secretary of War and the Chief of Engineers upon the applications for the approval of the contemplated diversions constituted a proper performance of the duties delegated to them by the Act of Congress of March 3, 1899. That action by deciding that the diversion is unobjectionable (within the limits specified in the War Department findings) so far as navigation is concerned, forecloses any contention of Connecticut that the diversion will injure navigation, in the absence of proof of bad faith	14-35
A. The duty of determining whether any given diversion of water, which if not diverted will flow into a navigable stream, will constitute or cause an obstruction of the navigable capacity of that stream devolves upon the Secretary of War and the Chief of Engineers under the Act of March 3, 1899. No direct action by Congress is necessary	14-22
The Wisconsin case	16
Contemporary construction of section 10	17

Page

War Department action in present case 19

No War Department permit needed for structures in non-navigable tributaries of navigable streams.. 20

B. The determinations of the Secretary of War upon the contemplated Swift and Ware diversions constitute a valid authorization of those diversions so far as the question of navigability is concerned.... 22-31

1. The correctness of the Secretary's determination cannot be reviewed, in the absence of proof of bad faith or failure to comply with applicable procedural requirements 22

2. Congress having undertaken a comprehensive scheme for the protection of navigation, the whole subject-matter, so far as within the scope of existing Congressional regulation, is the exclusive concern of Congress and of the War Department, by delegation of the power of Congress 26

C. Only the navigability issue is concluded by the War Department findings 31

D. The certain benefit in fact to the navigability of the Connecticut river as the result of the storage of water in the Swift river valley (particularly as modified by the War Department findings) strengthens the necessity of giving to the War Department decisions conclusive effect upon the issue of navigability 32

E. The allegations both of the original and of the amended answer deny that any injury to navigation in caused by the project. Issues of fact are thus raised which are appropriate for consideration by the Special Master appointed by this Court; provided that this Court should deem it proper, notwithstanding the action of the War Department, to consider the issue of the effect of the project upon navigation 34

II. The law applicable to the case at bar is to be determined by this Honorable Court in the light of the whole situation of fact; having due regard to the decisions of this Court in other interstate cases, to the municipal law in force in Massachusetts and Connecticut, to pertinent provisions of international law and practices, and to the customary methods of obtaining and using

Page

water in the two States here involved. No one of these factors is all important 35-79

A. The municipal riparian law of Connecticut and Massachusetts is not controlling. It is merely one element of the law of this case 37

B. The decisions of this Court establish the principle of the equitable division of the benefits arising from an interstate river among the States through which the river passes 43-54

Missouri v. Illinois 44

Kansas v. Colorado 45

The doctrine of equitable division applied 47

Equitable division of potential sewage dilution capacity 48

Wyoming v. Colorado 49

The North Dakota case 50

The drainage canal case 52

Recommendations of Special Master for a decree recognize prior claim of water supply 53

C. International law establishes the principle of equitable division of the benefits of interstate waters as between the sovereigns through whose lands the waters pass. In making an equitable division of beneficial use, due weight must be given to the comparative benefit to be derived by each sovereign from each particular use. The fundamental and most important use of water is for quenching thirst and for other domestic purposes 54-61

The development of international law as to uses of water 56

The priority doctrine recognized 56

Preference to municipal water supplies 57

A pending equitable division 59

Foreign interstate litigation precedents 60

Summary—Equitable division is the guiding principle 60

D. Under the municipal law both of Connecticut and of Massachusetts, so far as it furnishes an analogy of weight in this case, the Massachusetts project would be deemed reasonable 61-79

Page

1. Under the riparian law in force both in Massachusetts and in Connecticut a riparian owner is entitled to make a reasonable use of the waters flowing past his land, having due regard for the interests of upper and lower riparian owners upon the same stream 61

2. Connecticut habitually permits diversions of streams for the purpose of supplying municipalities with water for domestic use. Connecticut in equity cannot complain if Massachusetts makes reasonable use of interstate waters arising within her borders for similar purposes, even if a diversion be necessary; provided Massachusetts does not permanently abstract more than the share of such interstate waters to which she is entitled under the doctrine of equal division of benefit.... 68

III. Upon the issues raised by the answer, Massachusetts alleges facts which, if proved, constitute a full and adequate defense to the bill of complaint. The motions to dismiss and to strike out the answer should be denied and the case should be committed to the Special Master 79-90

A. Under the law applied by this Honorable Court in litigation as between States of the Union, Connecticut will not be entitled to relief in equity unless she shows great, unusual, and substantial damage to her sovereign rights. Equitable principles of comparative damage are applicable to this case 79

B. As a matter of law the facts alleged in the answer, if taken to be true, constitute a full defense to the bill, and specific equitable relief should be denied.. 81-87

The motion to dismiss 82

The motion to strike out 84

C. As a matter of discretion, this Honorable Court should deny the motions of Connecticut and should commit this case to the Special Master for findings of fact 88

APPENDIX "A" 91-99

The summary prepared by the Institute of International Law 91

Treaty recognition of equitable division principle..... 93

Page
European treaties concerning use of streams 94
Attitude of United States in controversy with Mexico.. 96
Interstate compacts 98
APPENDIX "B" 100-102
Brief statistical summary of the case 100
Diversions proposed 101

TABLE OF CASES CITED.

Alabama v. Georgia, 23 How. 505 41
Andrus v. Berkshire Power Co., 145 Fed. 47; 147 Fed. 76; 203 U.S. 596 78
Arkansas v. Tennessee, 246 U.S. 158 41
Balf Co. v. Hartford Electric Light Co., 106 Conn. 315.. 66
Beckerle v. Danbury, 80 Conn. 124..... 66
Blodgett v. Holden, 275 U.S. 142 21
Brickett v. Haverhill Aqueduct Co., 142 Mass. 394..... 78
Brookline v. Mackintosh, 133 Mass. 215 67
Buddington v. Bradley, 10 Conn. 212..... 62
Canton of Argovie v. Canton of Soleure, Arrêts du Tribunal Federal Suisse, XVIII, p. 689 60
Collins Mfg. Co. v. Wickwire Co., 14 Fed. (2d) 871..... 62, 67
Connecticut v. Massachusetts, 279 U.S. 821..... 5
DeWitt v. Bissell, 77 Conn. 530..... 67
Donnelly Brick Co. v. New Britain, 106 Conn. 167; 137 Atl. 745 ..... 63, 67
East Hartford Fire District v. Glastonbury Power Co., 92 Conn. 217 73
Elliot v. Fitchburg R.R., 10 Cush. 191..... 62, 64
Florida v. Mellon, 273 U.S. 12..... 20
Gibson v. United States, 166 U.S. 269 27
Gillett v. Johnson, 30 Conn. 180 63
Gilman v. Philadelphia, 3 Wall. 713..... 27
Harding v. Stanford Water Co., 41 Conn. 87..... 66
Harris v. Mackintosh, 133 Mass. 228 67
Hazard Powder Co. v. Somersville Mfg. Co., 78 Conn. 171 62
Hittinger Fruit Co. v. Cambridge, 218 Mass. 220..... 63
Ingraham v. Dunnell, 5 Met. 118 67
Isbell v. Greylock Mills, 231 Mass. 233..... 62, 63, 64
Kansas v. Colorado, 185 U.S. 125.....35, 37, 41, 45
Kansas v. Colorado, 206 U.S. 46
28, 31, 35, 37, 38, 39, 40, 41, 45, 79, 81
Keeney & Wood Mfg. Co. v. Union Mfg. Co., 39 Conn. 576 63

Page

Lawton v. Herrick, 83 Conn. 417 67
Louisiana v. Mississippi, 202 U.S. 1 41
Louisville Bridge Co. v. United States, 242 U.S. 409 ..... 20, 24
Mannville Co. v. Worcester, 138 Mass. 89 78
Martin v. Gleason, 139 Mass. 183 67
Mason v. Whitney, 193 Mass. 152 62
McNamara v. Taft, 196 Mass. 597 ..... 62, 66
Merrifield v. Lombard, 13 Allen 16 67
Miller v. Mayor, 109 U.S. 385 24
Missouri v. Illinois, 180 U.S. 208 ..... 37, 44, 48
Missouri v. Illinois, 200 U.S. 496 ..... 30, 37, 39, 41, 42, 44, 80
Monongahela Bridge Co. v. United States, 216 U.S. 177 .. 24
Morgan v. Danbury, 67 Conn. 484 67
Nebraska v. Iowa, 143 U.S. 359 41
New Haven Water Co. v. Russell, 86 Conn. 361 74
New Jersey v. Sargent, 269 U.S. 328 80
New York v. Illinois, 274 U.S. 488 ..... 20, 80
New York v. New Jersey, 256 U.S. 296 ..... 37, 42, 48, 80
New York City v. Pine, 185 U.S. 93 81
Nolan v. New Britain, 69 Conn. 668 67
North Dakota v. Minnesota, 263 U.S. 365 ..... 37, 50, 80
Parker v. American Woolen Co., 195 Mass. 591 ..... 62, 66
Parker v. Griswold, 17 Conn. 288 ..... 62, 63
Parker v. Hotchkiss, 25 Conn. 321 63
Pennsylvania v. West Virginia, 262 U.S. 553 ..... 41, 80
Pennsylvania v. Wheeling Bridge Co., 13 How. 518; 18 How. 421 24
Philadelphia Co. v. Stimson, 223 U.S. 605 24
Platt Bros. & Co. v. Waterbury, 72 Conn. 531 67
Richmond Screw Anchor Co. v. United States, 275 U.S. 331 21
Roach v. Sturdy, 250 Mass. 357 62
Rockville, etc., Co. v. Koelsch, 90 Conn. 171 67
Rockport v. Elwell, 219 Mass. 287 67
Sanitary District v. United States, 266 U.S. 405 26
South Carolina v. Georgia, 93 U.S. 4 24
Southern Pacific Co. v. Olympian Dredging Co., 260 U.S. 205 ..... 24, 26, 28
Stamford Extract Mfg. Co. v. Stamford Rolling Mills Co., 101 Conn. 310 ..... 62, 67
Stratton v. Mount Hermon Boys' School, 216 Mass. 83 62, 63, 64

Page

Taft v. Bridgeton Worsted Co., 237 Mass. 385 62
United States v. Chandler-Dunbar Co., 229 U.S. 53 ...24, 26, 27
United States v. Rio Grande Co., 174 U.S. 690 97
United States v. River Rouge Improvement Co., 269 U.S. 411 31
Water Commrs. v. Perry, 69 Conn. 461 63
Watson v. New Milford Water Co., 71 Conn. 442 65
Wier v. Covell, 29 Conn. 197 63
Wisconsin v. Illinois, 270 U.S. 634 ..... 31, 35
Wisconsin v. Illinois and Sanitary District, 278 U.S. 367 16, 18, 21, 23, 35, 37, 41, 52
Wyoming v. Colorado, 259 U.S. 419 .....39, 40, 41, 49

TABLE OF AUTHORITIES CITED.

Act of August 19, 1921 98
Act of December 21, 1928 99
Act of March 3, 1899, §9 .....7, 14, 21
Act of March 3, 1899, §10 .....7, 15, 21
Act of March 3, 1899, §18 24
Act of May 13, 1924 59
Act of September 19, 1890 26
Annuaire for 1911 91
Arrêts du Tribunal Federal Suisse, IV, p. 34 60
Arrêts du Tribunal Federal Suisse, XVIII, p. 689 60
119 British and Foreign State Papers, p. 541 95
121 British and Foreign State Papers, p. 798 98
British Treaty Series, No. 16, 1922 96
Colorado River Compact, November 14, 1922 98
Conn. General Statutes, c. 131 70
Conn. General Statutes, §2542 70
Conn. General Statutes, §5181 70
Conn. Priv. Laws, vol. 4, p. 1356 71
Conn. Priv. Laws, vol. 4, pp. 1364, 1366 72
Conn. Spec. Acts (1919), c. 129 72
Conn. Spec. Acts (1919), c. 164 72
Conn. Spec. Acts (1925), c. 295 72
Conn. Spec. Acts (1925), c. 340 72
Conn. Spec. Acts (1927), c. 340 72
Conn. Spec. Laws, vol. 5, p. 244 71
Conn. Spec. Laws, vol. 5, p. 333 72
Conn. Spec. Laws, vol. 5, p. 665 71
Conn. Spec. Laws, vol. 5, p. 673 72

Page

Conn. Spec. Laws, vol. 9, p. 910 72
Conn. Spec. Laws, vol. 11, p. 38 71
Conn. Spec. Laws, vol. 12, p. 91 72
Conn. Spec. Laws, vol. 14, p. 323 72
Conn. Spec. Laws, vol. 15, p. 584 72
Conn. Spec. Laws, vol. 15, p. 971 71
Conn. Spec. Laws, vol. 16, p. 240 72
Conn. Spec. Laws, vol. 16, pt. 1, pp. 389-395 72
Convention of January 11, 1909 ..... 56, 58
Descamps et Renault, Recueil International, p. 367 97
Lake of the Woods Agreement of February 24, 1925 ..... 59, 61
7 League of Nations Treaty Series, p. 35 95
26 League of Nations Treaty Series, p. 219 96
49 League of Nations Treaty Series, 381 97
Mass. Op. Atty. Gen., vol. III, p. 596 78
Mass. Stat. 1926, c. 375 ..... 6, 78, 101
Mass. Stat. 1927, c. 321 ..... 6, 32, 78, 101
1 Moore, Digest of International Law, pp. 653, 654 ..... 96, 97
34 Op. (U.S.) Atty. Gen., 410 18
Revue de Droit International Public, 1910, p. 281 91
Scott, Resolutions of the Institute, 1916, pp. 169-170 91
Special Master's Report, Wisconsin v. Illinois 22, 53, 58
26 Stat. at L. 453 26
30 Stat. at L. 1151 ..... 7, 14, 24
36 Stat. at L. 2448 57
42 Stat. at L. 171 98
43 Stat. at L. Part I, p. 118 59
44 Stat. at L. 2108 59
45 Stat. at L. 1062 99
Taft, William H., "Papers on the League of Nations," p. 99 40
Treaty of Neuilly 95
Treaty of St. Germain 94
Treaty of Trianon 95
Treaty of Versailles 93
U.S. Code, Tit. 33, §401 ..... 7, 14
U.S. Code, Tit. 33, §403 ..... 7, 14
U.S. Code, Tit. 33, §502 24
U.S. Const., art. I, §8 10
U.S. Foreign Relations, 1913, p. 977 97
1 U.S. Treaties and Conventions, p. 1204 97

In the

Supreme Court of the United States.

OCTOBER TERM, 1929.

No. 13, ORIGINAL.

THE STATE OF CONNECTICUT,

COMPLAINANT,

v.

THE COMMONWEALTH OF MASSACHUSETTS,

DEFENDANT.

SUBSTITUTE BRIEF OF THE DEFENDANT, THE COMMONWEALTH OF MASSACHUSETTS, IN OPPOSITION TO

1. Motion to Dismiss the Defendant's Answer;
2. Motion to Strike Out Portions of the Defendant's Answer.

STATEMENT OF THE CASE.

This is an original bill in equity filed by leave of court by the complainant, the State of Connecticut, seeking to prevent and enjoin the defendant, the Commonwealth of Massachusetts, from diverting—

(*a*) the flood waters of the Ware river,

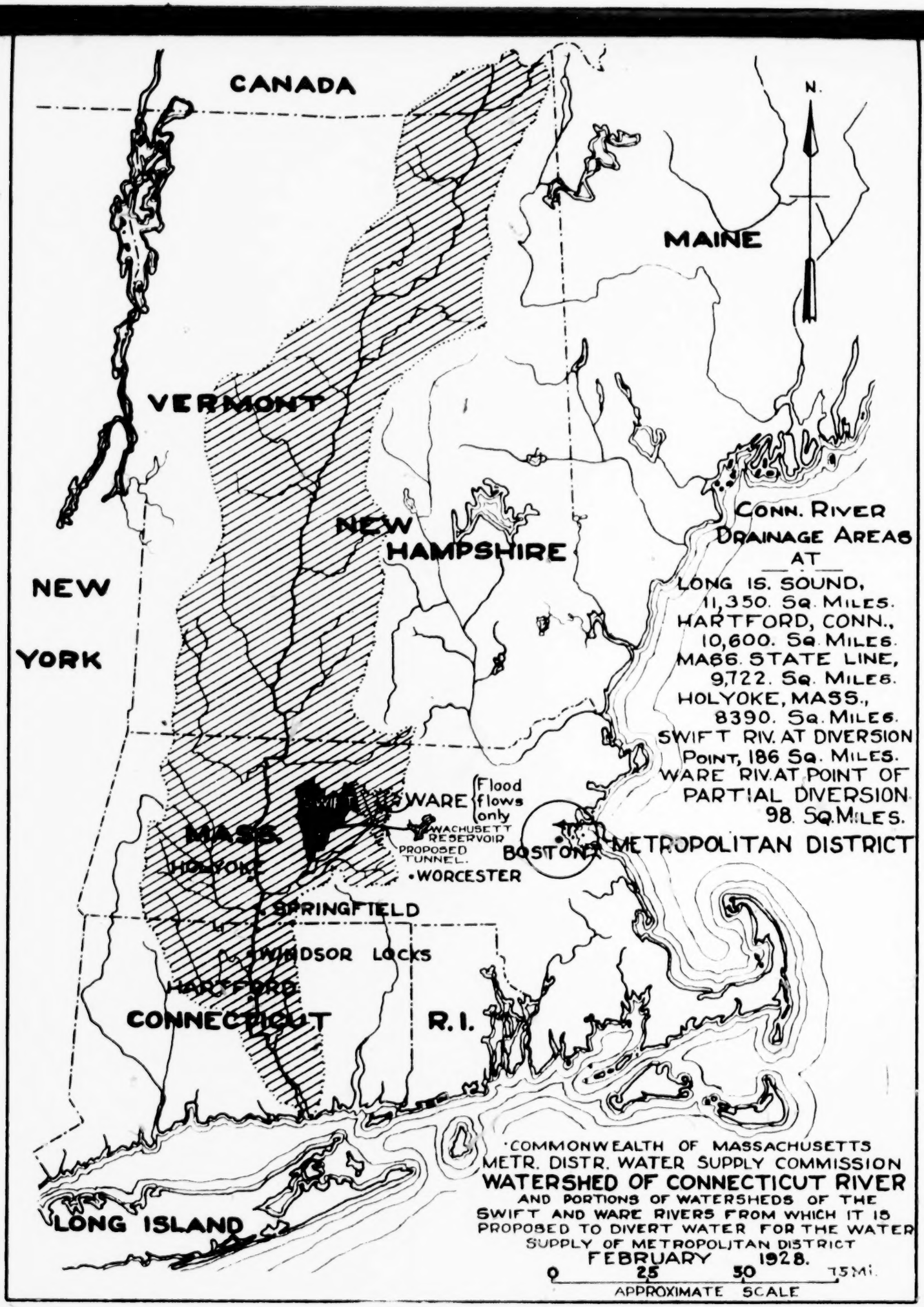
(*b*) certain waters of the Swift river,

both of which streams are non-navigable tributaries of the Chicopee river, itself a non-navigable tributary of the Connecticut river, and are situated wholly within the geographical limits of Massachusetts. (See map, Original Answer, opposite p. 32; Reprint of Answer, opposite p. 36; see this brief, opposite this page.) The purpose of the proposed diversion, authorized by two acts of the General Court of Massachusetts, is to provide a suitable supply of water for drinking and domestic use for the Metropolitan Area surrounding the City of Boston, which is now threatened with a serious water shortage (Answer, pp. 23-24; Reprint of Answer, pp. 26-27). The Massachusetts legislation authorizing the project is found in Acts of 1926, c. 375, and Acts of 1927, c. 321 (Answer, pp. 38-77; Reprint of Answer, pp. 36-80).

Connecticut, appearing not only as a proprietor of riparian lands (Bill, p. 6), but also as *parens patriae* (Bill, pp. 2, 6, 10, 13), alleges that the diversion will seriously impair navigation upon the Connecticut river (Bill, p. 10), that it will diminish the flow of water in the river sufficiently to cause damage to the health (Bill, pp. 8, 9, 11, 12), welfare, and property interests of Connecticut and her citizens, and that it will be a violation of the riparian rights (Bill, p. 7) of the State of Connecticut and of the citizens of that State, who, it is alleged, can be represented as against another sovereign State of the Union only by the State as *parens patriae*.

Analysis of Massachusetts Answer.

Massachusetts in an answer to the bill, filed by leave of court, denies that any injury to navigation, to the State of Connecticut, or to the citizens of that State will result from the proposed diversion, and affirmatively alleges that compared to the total flow in the Connecticut river at the Connecticut-Massachusetts boundary the flow to be diverted is



FILE 1.0 P ACC. 794

negligible and insignificant (Answer, pp. 1-27; Reprint of Answer, pp. 1-30—This answer was originally filed in March, 1928. It was amended by leave of court on December 2, 1929. The answer with amendments included has been reprinted and the reprint is herein referred to as "Reprint of Answer." All references to the Answer or to the Amended Answer may be found in the Reprint of the Answer at the point indicated in the particular reference). [It appears from the bill (p. 4) that the total watershed of the Connecticut river is 11,300 square miles. The total watershed of the Ware river is alleged to be 221 square miles and that of the Swift river is set forth as 213 square miles (Bill, p. 5). It appears from the answer of Massachusetts, however, that the drainage area of the Ware river above the point of partial diversion is only 98 square miles (Answer, par. 7, p. 9; Reprint of Answer, p. 11) and that the drainage area of the Swift river above the point of diversion is only 186 square miles (see Answer, par. 17, p. 18; Reprint of Answer, p. 21, and plan opposite Answer p. 32; Reprint of Answer, p. 36; Amended Answer, Appendix "C," p. 27; Reprint of Answer, p. 93—The statistics of the Massachusetts project are collected and summarized in Appendix "B" of this brief, *infra*, pp. 100-102).] Massachusetts also sets up certain affirmative legal and equitable defenses (Answer, pp. 27-32; Reprint of Answer, pp. 30-35), including—

(*a*) The existence of an emergency within Massachusetts constituting a justification for a reasonable use of the waters to be taken by the proposed diversion (Answer, pp. 27-28; Reprint of Answer, pp. 30-31).

(*b*) The existence of an adequate remedy at law in the State of Connecticut and its citizens in the form of compensation for any injury caused to the State or its citizens (Answer, pp. 24-25, 28-29; Reprint of Answer, pp. 31-32, 34).

(*c*) The serious injury to the welfare of the citizens of Massachusetts, if the diversion is prohibited, compared to the negligible and trivial damage to Connecticut and its citizens possibly caused if the diversion is permitted, which should lead a court of equity to give substitutional relief rather than specific relief (Answer, pp. 29, 30; Reprint of Answer, pp. 32, 34).

(*d*) The contention that the claim of Connecticut goes beyond a claim in behalf of the State in its true capacity as *parens patriae* (Answer, pp. 29-30; Reprint of Answer, p. 34).

(*e*) The contention that, so far as relief is sought for interference with navigation, the matter is one delegated under due constitutional authority by the Congress of the United States to the Secretary of War and his subordinates (Answer, pp. 6, 10, 30; Amended Answer, pp. 6-32; Reprint of Answer, pp. 33-34, 81-102).

(*f*) The contention that the diversion is one which is *de minimis* and in all respects a reasonable use of the waters of the Swift and Ware rivers by Massachusetts (Answer, pp. 11, 15, 18, 20, 22, 24, 28, 29, 31; Reprint of Answer, pp. 13, 14, 15, 17, 18, 21, 22, 23, 25, 26-27, 30, 33, 35).

(*g*) Laches (Answer, pp. 28, 31; Reprint of Answer, pp. 31, 34).

(*h*) The benefit to Connecticut and lower riparian owners from the stabilization of stream flow through the storage of water in wet seasons and the release of some of such stored water in dry seasons (Answer, pp. 11-12, 15, 19; Reprint of Answer, pp. 14-15, 22).

Connecticut's Unsuccessful Attempt to Join War Department Officials as Parties Respondent.

At the last term of court (October term, 1928) the State of Connecticut requested leave of this Honorable Court to file a motion which—

1. Sought to join the Chief of Engineers, United States Army, and the Secretary of War as parties respondent in this equity case.

2. Sought to obtain an injunction against these officials of the War Department—

(*a*) prohibiting them from acting upon the then pending application for a determination of the effect of the proposed diversion from the Swift river upon the navigable capacity of the navigable portion of the Connecticut river.

(*b*) ordering them to revoke their previously announced determination that (with certain insubstantial and immaterial limitations) the proposed diversion from the Ware river would have no adverse effect upon the navigable capacity of the Connecticut river.

The motion was based on allegations—

1. That the Secretary of War and the Chief of Engineers had no jurisdiction to determine that the proposed diversions would have no adverse effect on the navigation of the Connecticut river.

2. That the determination in fact made by the War Department officials was erroneous.

On April 22, 1929, this Honorable Court refused leave to Connecticut to file this motion, 279 U.S. 821.

Applications by Massachusetts to the War Department for Permission to Make the Proposed Diversions—Action thereon by the War Department.

On November 30, 1927 (Amended Answer, par. 1, p. 6; Answer, p. 6; Appendices to Amended Answer, "B" and "C," pp. 12-32; Reprint of Answer, pp. 81-102), the Metropolitan District Water Supply Commission (acting at the suggestion of the Providence District Engineer of the War Department) filed formal application for permits to make the diversions contemplated under the Massachusetts legislation (Answer, Appendix "A," pp. 33-77;

Reprint of Answer, pp. 36-80). After public hearings and extended investigation, during which counsel and engineers for the State of Connecticut were heard at length, the War Department, upon recommendation of the Chief of Engineers and with the approval of the Secretary of War, determined—

(*a*) on March 14, 1928, that the proposed diversion from the Ware river "will have no adverse effect on the navigable capacity of the Connecticut River" (Amended Answer, p. 7; Appendix "B" thereto, p. 16; Reprint of Answer, pp. 8, 85-87), and announced that the War Department would interpose no objection to such proposed diversion, provided that it remained within stipulated limits substantially those of the Massachusetts Acts of 1926, chapter 375, section 4 (Answer, pp. 37-38; Reprint of Answer, pp. 40-41);

(*b*) on May 11, 1929, that the proposed diversion from the Swift river [if kept within certain limits, set forth in the order of the Department; which limits will result in a modification of the diversion authorized by the Massachusetts Acts of 1927, chapter 321, section 1 (see Answer, pp. 48-50; Reprint of Answer, pp. 51-53)] would not substantially alter or modify the condition or navigable capacity of the channel of the navigable portion of the Connecticut river (Amended Answer, p. 7; Appendix "C," p. 29; Reprint of Answer, pp. 8, 99-100), and announced that subject to the limitations stipulated the Department would interpose no objection to the proposed diversion.

War Department approval has thus been obtained for the whole Ware river diversion contemplated by the Massachusetts legislation, with trivial and immaterial modifications; and for very much the greater part of the Swift river diversion authorized by the Massachusetts legislation. Of course, while the War Department limitations remain in effect, they will, as a practical matter, control the terms of the diversion in so far as they are inconsistent with the Massachusetts legislation.

The Amendments of the Answer.

The action of the War Department did not take place until after the filing in March, 1928, of the original answer in these equity proceedings. Certain provisions of the answer required amendment in view of these recent events. The answer as amended contains the pertinent portions of the applications to the War Department and of the decisions of that Department (Appendices "B" and "C"; Amended Answer, pp. 12-32; Reprint of Answer, pp. 81-102). The amendments were allowed December 2, 1929.

SUMMARY AND ANALYSIS OF THE PRESENT MOTIONS AND OF THE ARGUMENTS OF THE PARTIES.

The Present Motions of the Complainant.

The State of Connecticut now seeks leave to file—

(*a*) a motion to dismiss the defendant's answer.

(*b*) a motion to strike out certain portions of the defendant's answer.

These motions in the nature of demurrers to the whole answer or to specific portions of the answer raise generally the following contentions:

1. Connecticut contentions relating to navigation.

Connecticut contends (Mot. to Dismiss, pars. 2-9, pp. 5-8; Mot. to Strike Out, par. 8, pp. 20-24; see Argument, *infra*, pp. 14-35) that the answer and (in the motion to strike out) that certain passages thereof reveal that Massachusetts has not obtained the necessary authorization of its project from Congress or from the Secretary of War; particularly under the provisions of the Act of March 3, 1899, §§ 9 and 10 (30 STAT. AT L. 1151, U.S. Code, Tit. 33, §§ 401, 403, quoted, *infra*, pp. 14-15).

The Massachusetts answer reveals that the Secretary of War has found that the project (with certain modifications) will not impair navigation upon any navigable water (Amended Answer, Appendices "B" and "C," pp. 12-32; Reprint of Answer, pp. 81-102). It is the contention of Massachusetts that this action of the Secretary of War is the only Federal action, if any, possibly required by the Act of March 3, 1899, inasmuch as Massachusetts is not erecting any structures in a navigable stream or (according to the War Department findings) altering the navigable capacity of any navigable stream.

2. Connecticut contentions relating to the alleged riparian rights of Connecticut and her citizens and to the alleged taking of those rights.

Connecticut alleges that the answer shows that the Massachusetts project reveals a diversion which is an invasion of the riparian rights of Connecticut and of her individual citizens regardless of the effect of the diversion or of its size with relation to the whole stream flow of the Connecticut river at the Massachusetts-Connecticut boundary (Motion to Dismiss, pars. 14-16, pp. 8-11; see also Mot. to Strike Out, pars. 9, 10, 11, 12, pp. 24-30). The further contention is made (Motion to Dismiss, pars. 10-13, pp. 8-9; see also Motion to Strike Out, pars. 9, 10, 11, and 12, pp. 24-30) that the proposed diversion by authorization of the Massachusetts Legislature is in effect an attempt by Massachusetts to take by eminent domain property rights in Connecticut. It is contended that this is beyond the power of Massachusetts.

The Massachusetts answer, either by the denial of allegations contained in the Connecticut bill or by affirmative allegation, sets up facts showing that the Massachusetts project will in fact result in the diversion of only a small portion of the waters which flow in the Connecticut river

across the Connecticut–Massachusetts boundary, and that this diversion,—

(*a*) will have no adverse effect upon the navigable capacity of the Connecticut river.

(*b*) will constitute only a reasonable use of the interstate stream.

(*c*) will in fact have no tendency to injure health, welfare, safety, or property of the State of Connecticut or its citizens.

(*d*) will benefit Connecticut by stabilizing stream flow, through the storage of flood waters, some of which will be released as a compensatory flow in dry summer months.

These facts, Massachusetts contends (see summary of argument, *infra*, pp. 12-13), reveal that the project is within her sovereign power because the proposed diversion constitutes a reasonable use of the waters of the Connecticut river watershed, not only under the principle of equitable division between States of the benefit to be derived from an interstate stream but also under the principles of riparian law in force in the two States.

3. Connecticut contentions that facts alleged in answer are immaterial so far as they form basis for equitable defenses, or for the application of equitable principles of denial of specific relief.

Connecticut contends that the following allegations of the answer are immaterial, viz.: those setting up the existing emergency in Boston (Mot. to Dismiss, pars. 15 and 16, pp. 10-11; Mot. to Strike Out, pars. 3, 5, pp. 8-12, 14); the benefit to Connecticut of a compensatory flow in summer months (Mot. to Strike Out, pars. 1, 2, 7, 10, pp. 5-8, 17-20); the existence of an adequate remedy at law (Mot. to Strike Out, par. 6, pp. 14-17); and laches (Mot. to Strike Out, par. 4, pp. 12-14). Massachusetts contends that these allegations not only show the reasonable nature of the diversion but also furnish a basis for the application

of equitable defenses and for the denial of specific relief upon the equitable principle of comparative damage and necessity.

With respect to all Connecticut's contentions, Massachusetts submits that the issues are of such wide scope and so important as to necessitate a finding of all the facts by the Special Master appointed in this cause before any determination by this Honorable Court of the materiality of the facts stated in the answer.

POINTS AND AUTHORITIES.

Summary of Argument.

There are two main groups of issues involved in these motions:

(1) Those issues relating to the Federal interest in the protection of navigation upon the Connecticut river; an interest based upon the power given to Congress to regulate interstate and foreign commerce under article I, section 8, of the Constitution of the United States.

(2) Those issues relating to the sovereign and riparian rights of Connecticut and Massachusetts *inter se* as *quasi*-sovereign States—apart from any superior Federal interest in navigation.

We contend that the first group of issues is to all intents determined by the action of the War Department set forth in the Amended Answer, Appendices "B" and "C," pp. 12-32; Reprint of Answer, pp. 81-102. The second group of issues deals with the problem of what principles of law are applicable to this case—and with the application of those principles to the facts as pleaded.

We shall make the following contentions:

I. The action of the Secretary of War and the Chief of Engineers upon the applications for the approval of the contemplated diversions constituted a proper perform-

ance of the duties delegated to them by the Act of Congress of March 3, 1899. That action by finding the proposed diversions unobjectionable (within the limits specified in the War Department findings) so far as navigation is concerned, forecloses any contention of Connecticut that the diversion will injure navigation, in the absence of proof of bad faith (*infra*, pp. 14-35).

A. The duty of determining whether any given diversion of water, which if not diverted will flow into a navigable stream, will constitute or cause an obstruction of the navigable capacity of that stream devolves upon the Secretary of War and the Chief of Engineers under the Act of March 3, 1899. No direct action by Congress is necessary under section 9 or section 10 of that act in view of the action of the Secretary of War in the present case and because of the fact that the Massachusetts project contemplates no structure in any navigable water (*infra*, pp. 14-22).

B. The determinations of the Secretary of War upon the contemplated Swift and Ware diversions constitute a valid authorization of those diversions so far as the question of navigability is concerned (*infra*, pp. 22-31).

1. The correctness of the Secretary's determination cannot be reviewed, in the absence of proof of bad faith or failure to comply with applicable procedural requirements (*infra*, pp. 22-26).

2. Congress having undertaken a comprehensive scheme for the protection of navigation, the whole subject-matter, so far as within the scope of existing Congressional regulation, is the exclusive concern of Congress and of the War Department, by delegation of the power of Congress (*infra*, pp. 26-31).

C. Only the navigability issue is concluded by the War Department findings (*infra*, p. 31).

D. The certain benefit in fact to the navigability of the Connecticut river as the result of the storage of water in the Swift river valley (particularly as modified by the War Department findings) strengthens the necessity of giving to the War Department decisions conclusive effect upon the issue of navigability (*infra*, pp. 32-34).

E. The allegations both of the original and of the amended answer deny that any injury to navigation is caused by the project. Issues of fact are thus raised which are appropriate for consideration by the Special Master appointed by this Court; provided that this Court should deem it proper, notwithstanding the action of the War Department, to consider the issue of the effect of the project upon navigation (*infra*, pp. 34-35).

II. The law applicable to the case at bar is to be determined by this Honorable Court in the light of the whole situation of fact; having due regard to the decisions of this Court in other interstate cases, to the municipal law in force in Massachusetts and Connecticut, to pertinent provisions of international law and practices, and to the customary methods of obtaining and using water in the two States here involved. No one of these factors is all important (*infra*, pp. 35-79).

A. The municipal riparian law of Connecticut and Massachusetts is not all important. It is merely one element of the law of this case (*infra*, pp. 37-43).

B. The decisions of this Court establish the principle of an equitable division of the benefits arising from an interstate river among the States through which the river passes (*infra*, pp. 43-54).

C. International law establishes the principle of equitable division of the benefits of interstate waters as between the sovereigns through whose lands the waters pass. In making an equitable division of beneficial use,

due weight must be given to the comparative benefit to be derived by each sovereign from each particular use. The fundamental and most important use of water is for quenching thirst and for other domestic purposes (*infra*, pp. 54-61).

D. The riparian law in force in Connecticut and in Massachusetts and the practice of the two States in permitting diversions of water for domestic water supply purposes is an element of the law applicable to this case (*infra*, pp. 61-79). Inasmuch as the riparian law permits reasonable diversions of water and inasmuch as Connecticut habitually permits diversions of streams for the purpose of supplying municipalities with water for domestic use, Connecticut in equity cannot complain if Massachusetts makes reasonable use of interstate waters arising within her borders for similar purposes, even if a diversion be necessary: provided Massachusetts does not permanently abstract more than the share of such interstate waters to which she is entitled under the doctrine of equal division of benefit.

III. Upon the issues raised by the answer, Massachusetts alleges facts which, if proved, constitute a full and adequate defense to the bill of complaint. The motions to dismiss and to strike out the answer should be denied and the case should be committed to the Special Master.

A. As a matter of law the facts alleged in the answer, if taken to be true, constitute a full defense to the bill, and specific equitable relief should be denied (*infra*, pp. 79-87).

B. It is respectfully submitted that, as a matter of discretion, this Honorable Court should deny the motions of Connecticut and should commit this case to the Special Master for findings of fact (*infra*, pp. 88-90).

I.

THE ACTION OF THE SECRETARY OF WAR AND THE CHIEF OF ENGINEERS UPON THE APPLICATIONS FOR THE APPROVAL OF THE CONTEMPLATED DIVERSIONS CONSTITUTED A PROPER PERFORMANCE OF THE DUTIES DELEGATED TO THEM BY THE ACT OF CONGRESS OF MARCH 3, 1899. THAT ACTION BY DECIDING THAT THE DIVERSION IS UNOBJECTIONABLE (WITHIN THE LIMITS SPECIFIED IN THE WAR DEPARTMENT FINDINGS) SO FAR AS NAVIGATION IS CONCERNED, FORECLOSES ANY CONTENTION OF CONNECTICUT THAT THE DIVERSION WILL INJURE NAVIGATION, IN THE ABSENCE OF PROOF OF BAD FAITH.

A. The Duty of Determining whether Any Given Diversion of Water, which if Not Diverted will Flow into a Navigable Stream, will Constitute or Cause an Obstruction of the Navigable Capacity of that Stream Devolves upon the Secretary of War and the Chief of Engineers under the Act of March 3, 1899. No Direct Action by Congress is Necessary.

Sections 9 and 10 of the Act of March 3, 1899, 30 STAT. AT L. 1151 (U.S. Code, Tit. 33, §§ 401, 403), read as follows:

> "SEC. 9. That it shall not be lawful to construct or commence the construction of any bridge, dam, dike, or causeway over or in any port, roadstead, haven, harbor, canal, navigable river, or other navigable water of the United States until the consent of Congress to the building of such structures shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of War; *Provided*, That such structures may be built under authority of the legislature of a State across rivers and other waterways the navigable portions of which lie wholly within,

the limits of a single State, provided the location and plans thereof are submitted to and approved by the Chief of Engineers and by the Secretary of War before construction is commenced: *And provided further*, That when plans for any bridge or other structure have been approved by the Chief of Engineers and by the Secretary of War, it shall not be lawful to deviate from such plans either before or after completion of the structure unless the modification of said plans has previously been submitted to and received the approval of the Chief of Engineers and of the Secretary of War.

"SEC. 10. That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner *to alter or modify the* course, location, condition, or *capacity of*, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, *or of the channel of any navigable water of the United States*, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same." (Italics ours.)

The Wisconsin Case.

The precise nature of the authority and duty delegated by Congress in these sections was recently considered by this Honorable Court in—

> *Wisconsin* v. *Illinois and Sanitary District*, 278 U.S. 367, 412-413—

where it was said:

> "The policy carried out in the Act of March 3, 1899, had been begun in the Act of September 19, 1890, c. 907; 26 Stat. 454, 455. Sections 9 and 10 were the rearranged result of the provisions of Sections 7 and 10 of the Act of 1890. A new classification was made in Sections 9 and 10 of the Act of 1899, and substituted for Section 10 of the Act of 1890. The latter provided that the creation of any obstruction to navigable capacity was prohibited, unless 'affirmatively authorized by law' and this was changed so as to read 'affirmatively authorized by Congress.' The change in the words of the first clause of Section 10 was intended to make mere State authorization inadequate. *Sanitary District* v. *United States*, 266 U. S. 405, 429; *United States* v. *Bellingham Bay Boom Co.*, 176 U. S. 211. It was not intended to override the authority of the State to put its veto upon the placing of obstructing structures in navigable waters within a State and both State and Federal approval were made necessary in such case. *Cummings* v. *Chicago*, 188 U. S. 410. The words 'affirmatively authorized by Congress' should be construed in the light of the administrative exigencies which prompted the delegation of authority in the succeeding clauses. Congress, having stated in Section 9 as to what particular structures its specific consent should be required, intended to leave to the Secre-

tary of War, acting on the recommendation of the Chief of Engineers, the determination of what should be approved and authorized in the classes of cases described in the second and third clauses of Section 10. If the section were construed to require a special authorization by Congress whenever in any aspect it might be considered that there was an obstruction to navigable capacity, none of the undertakings specifically provided for in the second and third clauses of Section 10 could safely be undertaken without a special authorization of Congress. *We do not think this was intended.* [Italics ours.] The Supreme Court of Maine in *Maine Water Co.* v. *Knickerbocker Steam Towage Co.*, 99 Me. 473, took the same general view in construction of the same section. It held that the broad words of the first clause of that section were not intended to limit the second and third clauses and that Congress's purpose was a direct prohibition of what was forbidden by them except when affirmatively approved by the Chief of Engineers and the Secretary of War. We concur in this view.

"The true intent of the Act of Congress was that unreasonable obstructions to navigation and navigable capacity were to be prohibited, and in the cases described in the second and third clauses of Section 10, the Secretary of War, acting on the recommendation of the Chief of Engineers, was authorized to determine what in the particular cases constituted an unreasonable obstruction."

Contemporary Construction of Section 10.

The Court (at p. 413) then adverts to and approves the contemporary construction of section 10 by the War Department, especially as revealed by the Opinion of the Acting Attorney General to the Secretary of War (February

13, 1925), 34 Op. Atty. Gen. 410, 416, where the Acting Attorney General says:

> "In my opinion Congress thus intended to delegate to the Chief of Engineers and the Secretary of War an administrative authority to determine a fact; and if they were of opinion that the use of navigable waters in a certain case was not such an impairment of their navigability as to require the prohibition of Congress, then the construction was 'affirmatively authorized by Congress,' because the administrative agency to which Congress had delegated the ascertainment of the facts had found the fact to be that such use was not for the time being an impairment of navigable capacity such as Congress intended to prohibit.
>
> "I am informed that for a long period of years it has been the practice of the War Department to issue permits under section 10 of the Act of March 3, 1899, without requiring that the particular project be first authorized by special Act of Congress, and that was the policy of the War Department in the specific case of the Sanitary District of Chicago."

The following language of the opinion in *Wisconsin* v. *Illinois and Sanitary District* shows that the court clearly had in mind the precise nature of the determination of fact thus left by Congress to the Secretary of War and to the Chief of Engineers (at p. 414):

> "But it is said the construction thus favored would constitute it a delegation by Congress of legislative power and invalid. We do not think so. The determination of the amount that could be safely taken from the Lake is one that is shown by the evidence to be a peculiarly expert question. It is such a question as this that is naturally within the executive function that can be deputed by Congress. . . .

"The construction of Section 10 of the Act of March 3, 1899, was settled by this Court in the decision of the first Chicago Drainage Canal case in 266 U. S. 405, 429. The decision there reached and the decree entered can not be sustained, except on the theory that the Court decided first that Congress had exercised the power to prevent injury to the navigability of Lake Michigan and the other lakes and rivers in the Great Lakes watershed, and second that it could properly and validly confer the administrative function of passing on the issue of unlawful injury or otherwise on the Secretary of War, and that it had done so."

War Department Action in Present Case.

The action of the War Department upon the Massachusetts applications for approval of the contemplated diversions has been fully set out above (see *supra*, pp. 5-6; see Amended Answer, pp. 5-8; Appendices "B" and "C," pp. 12-32; Reprint of Answer, pp. 81-102). It must be taken as true (since there is no allegation in the complaint to the contrary) that the appropriate officials of the War Department—

1. Acted in good faith.

2. Made a reasonable, proper, and warranted finding of fact that the proposed diversion from the Ware river would have no adverse effect on navigation.

3. Made a similar finding of fact with respect to the Swift diversion (subject to the limitations contained in the finding. See Amended Answer, Appendix "C," pp. 19-32; Reprint of Answer, pp. 89-102).

4. Acted in all respects within the scope of their duty under section 10, which was—

(*a*) to approve or waive objection to the project, though for a purpose not connected with the improvement of navi-

gation, if the execution of the project would have no unreasonable adverse effect on navigation;

(*b*) to withhold approval if the navigable capacity of existing waterways would be unreasonably impaired by the execution of the project.

It is, of course, clearly unnecessary for the Secretary to deny permission for a present diversion which is not harmful to navigation, merely because at some future date a project in aid of navigation may require, for purposes of storage for use in seasons of low water, the water now proposed to be diverted. The Secretary is bound to look only at the situation as it exists at the time of granting the application.

> *Louisville Bridge Co.* v. *United States*, 242 U.S. 409, 425.

This Court will not entertain an original bill seeking relief for a fanciful injury conceivably to be suffered in the distant future.

> *New York* v. *Illinois*, 274 U.S. 488, 490.
> *Florida* v. *Mellon*, 273 U.S. 12, 18.

No War Department Permit Needed for Structures in Non-Navigable Tributaries of Navigable Streams.

A large portion of the contentions upon the issue of navigability in the present Connecticut motions rests upon some theory that Massachusetts requires the permission of the Congress under sections 9 and 10 of the Act of March 3, 1899, before erecting a dam in the valley of the *non*-navigable Swift river (see *e.g.*, Mot. to Dismiss, pars. 3, 4, 6, 7, 9, pp. 6-8; Mot. to Strike Out, par. 8, esp. pp. 23-24). Such a contention, pushed to its logical conclusion, would require the consent of Congress before the smallest mill dam could be built on the smallest stream, if that stream flowed eventually into a navigable river. This con-

tention of Connecticut is, we submit, entirely frivolous. The plain words of section 9 ("any . . . dam, dike . . . in any . . . *navigable river or other navigable water*"—see *supra*, p. 9) and of section 10 ("or other structure in any . . . navigable river, or other water of the United States" —see *supra*, p. 10) indicate beyond any doubt that Congress intended to regulate only the erection of structures actually placed in the *navigable* portions of *navigable* streams—and in no way intended to do what it has probably no constitutional power to do, *i.e.*, to regulate the construction of works in non-navigable streams. If there were any room for doubt as to the meaning of sections 9 and 10, we submit that this Court should adhere to its ordinary rule of statutory construction and adopt (as between a statutory construction which raises strong doubts as to the constitutionality of an act of Congress and another construction which renders the statute unquestionably valid) the construction which leaves no room for any holding or argument that the legislative department has exceeded its powers.

> *Richmond Screw Anchor Company* v. *United States*, 275 U.S. 331, 346.
> *Blodgett* v. *Holden*, 275 U.S. 142, 148.

This Court has made it clear that section 9 would be construed to apply only to the specific structures therein mentioned.

> *Wisconsin* v. *Illinois*, 278 U.S. 367, 412-413 (quoted *supra*, p. 16).

No structures in non-navigable streams are mentioned in section 9, so it is certain that no authorization by act of Congress is necessary before Massachusetts or any riparian owner can build a dam in the non-navigable Swift river. We submit that it is equally certain that the second clause of section 10 applies only to structures actually placed in

navigable waters of the United States and that the section does not apply to any structure in a non-navigable stream. It is, of course, true that the construction of a dam in a non-navigable stream in and of itself has no necessary effect upon the navigable capacity of any navigable water into which the non-navigable stream may flow. For that reason there is no basis for Congressional control of the *erection* of dams in *non*-navigable waters. The *use* of such dams in such a way as to create an obstruction to the navigable capacity of any navigable water of the United States is, of course, subject to the Congressional control, which has been delegated by section 10 to the Secretary of War and to the Chief of Engineers.

B. The Determinations of the Secretary of War upon the Contemplated Swift and Ware Diversions Constitute a Valid Authorization of those Diversions so Far as the Question of Navigability is Concerned.

1. The correctness of the Secretary's determination cannot be reviewed, in the absence of proof of bad faith or failure to comply with applicable procedural requirements.

This Court has always held that Congress had full constitutional authority to decide what things constituted obstructions to navigation and what things did not. The cases on the subject are comprehensively reviewed in the Report of the Special Master in the case of *Wisconsin* v. *Illinois and Sanitary District* (see pp. 161-165). The Special Master summarizes his conclusions (at p. 164):

> "The question whether such an abstraction should be altogether prohibited, or the extent to which it should be permitted with regard to the interests of navigation, when and in what circumstances and in what amount a diversion of water from the lake would constitute an obstruction to navigation, are questions

> within the power of Congress to decide in the exercise of its control over navigable waters for the purposes of navigation. When these questions have been determined by Congress, or under its authority validly conferred, they are not open to reconsideration by the court."

When the *Wisconsin* case (278 U.S. 367) was decided by this Court, it cut under the rule of law laid down by the Master and decided, as a matter of equity between two parties (properly before the Court acting within its original jurisdiction), that one party could not be allowed, by committing a nuisance, to create a situation which made necessary a remedial permit from the Secretary of War. The Secretary in 1925 was faced with a situation of fact and upon that situation made a valid determination in the interests of navigation. This Court in no sense disapproved the propriety of that determination, but held it proper. The Court, however, did order that the Sanitary District stop its inequitable conduct so that the Secretary would not be forced to a determination which would result in an impairment of existing navigable capacity on the Lakes. The finality of the Secretary's determination upon a given set of facts was, we submit, in no degree questioned, and the language of the *Wisconsin* case (especially at pp. 413-414) gives every indication that this Court approved the conclusion of the special master following earlier decisions of this Court:

1. That Congress could itself finally determine whether a diversion would obstruct navigable capacity.

2. That Congress could delegate that duty to the Secretary of War and his staff of expert subordinates, who were particularly fitted to make the determination of fact.

3. That the determination made in good faith was not subject to direct judicial review.

The earlier cases raise the problem more directly and uniformly hold that where the Secretary is acting to aid navigation, or is indicating that there is no injury to the Federal interest in the maintenance of navigation involved in a particular project, his determinations of fact have always been treated as final, by this Court, and as not subject to judicial review.

> *Pennsylvania* v. *Wheeling Bridge Co.*, 18 How. 421, 430, as affecting s.c. 13 How. 518, 625.
>
> *South Carolina* v. *Georgia*, 93 U.S. 4, 12.
>
> *Miller* v. *Mayor*, 109 U.S. 385, 393, 395.
>
> *Monongahela Bridge Co.* v. *United States*, 216 U.S. 177, 193.
>
> *Philadelphia Co.* v. *Stimson*, 223 U.S. 605, 635, and cases there cited.
>
> *United States* v. *Chandler-Dunbar Co.*, 229 U.S. 53, 64-65.
>
> *Louisville Bridge Co.* v. *United States*, 242 U.S. 409.
>
> *Southern Pacific Co.* v. *Olympian Dredging Co.*, 260 U.S. 205, 210, and cases cited.

The *Monongahela Bridge Co.* case is explicit upon the question. The Secretary of War (the present Chief Justice), acting under section 18 of the Act of March 3, 1899 (30 STAT. AT L. 1151, 1153, U.S. Code, Tit. 33, § 502), had ordered that the bridge there in question be so altered as to render it no longer an obstruction to navigation. A criminal information was filed stating non-compliance by the defendant company with the terms of the Secretary's order and the jury returned a verdict of guilty. By a motion in arrest of judgment the constitutionality of the Act of 1899 was contested. The motion was denied and a fine imposed. This Court upon writ of error held:

1. That the Act of March 3, 1899, laid down a (at p. 192) "general rule, applicable to all navigable waters, that free navigation should not be hampered by unreasonable obstructions . . . ; that . . . Congress charged the Secretary of War with the duty of ascertaining, in each case, . . . whether the particular bridge came within the general rule prescribed; that any other method was impracticable in view of the vast and varied interests of the Nation requiring legislation . . ."

2. That the Secretary must not act in arbitrary fashion, but must give notice and an opportunity to be heard to parties interested, and must allow a reasonable time for alterations. (Parenthetically, it may be here pointed out that there is no allegation in the bill, or in the pending motions in the case at bar, that the State of Connecticut has not had full opportunity to present all her claims. Allegations which affirmatively show not only a comprehensive study of the whole situation by the War Department, but also that Connecticut has been heard at length by the Secretary and his subordinates at all stages of the proceedings are contained in the Amended Answer, p. 7; see also Appendices "B" and "C," pp. 12-32; Reprint of Answer, pp. 8-9, 81-102).

3. That the decision of the Secretary, made in good faith, is final to all intents and purposes and that (at p. 195)—

> "It was not for the jury to weigh the evidence and determine according to *their* judgment, as to what the necessities of navigation required, or whether the bridge was an unreasonable obstruction. The jury might have differed from the Secretary. That was immaterial; for Congress intended by its legislation to give the same force and effect to the decision of the Secretary of War that would have been accorded to direct action by it on the subject. It is for Congress, under

the Constitution, to regulate the right of navigation by all appropriate means, to declare what is necessary to be done in order to free navigation from obstruction, and to prescribe the way in which the question of obstruction shall be determined. Its action in the premises cannot be revised or ignored by the courts or by juries, except that when it provides for an investigation of the facts, upon notice and after hearing, before final action is taken, the courts can see to it that Executive officers conform their action to the mode prescribed by Congress."

2. Congress having undertaken a comprehensive scheme for the protection of navigation, the whole subject-matter, so far as within the scope of existing Congressional regulation, is the exclusive concern of Congress and of the War Department, by delegation of the power of Congress.

It has frequently been held that, by the provisions of the Act of September 19, 1890 (26 STAT. AT L. 453, 454), and by the acts amending the 1890 act, Congress has assumed jurisdiction of the subject of obstructions to navigation in accordance with a policy of direct and general control over the navigable waters of the United States.

Southern Pacific Co. v. *Olympian Dredging Co.*, 260 U.S. 205, 207-208.
Sanitary District v. *United States*, 266 U.S. 405, 425-426, 428-429.

The 1890 act and the 1899 amendments (*supra*, pp. 14-15) are an exercise of the power to keep open and free from any obstructions to their navigation all of the navigable waters within the United States which are accessible from a State other than those States in which they lie.

United States v. *Chandler-Dunbar Co.*, 229 U.S. 53, 62-65, and cases cited.

See *Gilman* v. *Philadelphia*, 3 Wall. 713, 724.
Gibson v. *United States*, 166 U.S. 269, 271.

In the *Chandler-Dunbar* case, *supra*, at p. 64, it was said:

"So unfettered is this control of Congress over the navigable streams of the country that its judgment as to whether a construction in or over such a river is or is not an obstacle and a hindrance to navigation, is conclusive. Such judgment and determination is the exercise of legislative power in respect of a subject wholly within its control.

"In *Pennsylvania* v. *Wheeling Bridge Company*, 18 How. 421, 430, this court, upon the facts in evidence, held that a bridge over the Ohio River, constructed under an act of the State of Virginia, created an obstruction to navigation, and was a nuisance which should be removed. Before the decree was executed Congress declared the bridge a lawful structure and not an obstruction. This court thereupon refused to issue a mandate for carrying into effect its own decree, saying:

"'Although it still may be an obstruction in fact, it is not so in the contemplation of law. We have already said, and the principle is undoubted, that the act of the legislature of Virginia conferred full authority to erect and maintain the bridge, subject to the exercise of the power of Congress to regulate the navigation of the river. That body having in the exercise of this power, regulated the navigation consistent with its preservation and continuation, the authority to maintain it would seem to be complete. That authority combines the concurrent powers of both governments, State and Federal, which, if not sufficient, certainly none can be found in our system of government.'"

The finality of the decision of the War Department officials upon the issue of obstruction, so far as direct attack upon that decision is concerned, is definitely settled by the opinions of this Honorable Court, cited *supra*, pp. 24-25. We contend, however, that it is equally well settled that the decision of the Department is fully as final when attacked collaterally in proceedings to which neither the Department nor the United States is a party. When the waiver or permit of the War Department is relied upon as an authorization or defense, it is, we submit, conclusive of the issue of obstruction or injury to navigation.

This is certainly true when the existence of an obstruction to navigation becomes of importance in litigation as between private parties.

> *Southern Pacific Co.* v. *Olympian Dredging Co.*, 260 U.S. 205, 207-208, 209-210, and cases cited.

We contend that no different rule applies when the determination of the War Department that no obstruction to navigation exists in any particular instance is raised in the course of litigation before this Honorable Court, within its original jurisdiction.

In *Kansas* v. *Colorado*, 206 U.S. 46, 85 *et seq.*, this Honorable Court, in considering the nature of its original jurisdiction as between States, took a distinction as between the method of determining issues over which the Federal Government had controlling power and the method of determining other justiciable issues between the States as to which this Court as a *quasi*-international tribunal had final power. So far as the issues in the case were subject to national control, the Court intimated that the action, if any, of the Federal Government within its proper constitutional sphere would be treated as of primary importance as governing the national phases of the situation.

"Is the question one solely between the States or is the matter subject to national legislative regulation, and, if the latter, to what extent has that regulation been carried? Clearly this controversy is one of a justiciable nature. The right to the flow of a stream was one recognized at common law, for a trespass upon which a cause of action existed.

"The primary question is, of course, of national control. For, if the Nation has a right to regulate the flow of the waters, we must inquire what it has done in the way of regulation. If it has done nothing the further question will then arise, what are the respective rights of the two States in the absence of national regulation? Congress has, by virtue of the grant to it of power to regulate commerce 'among the several States,' extensive control over the highways, natural or artificial, upon which such commerce may be carried. It may prevent or remove obstructions in the natural waterways and preserve the navigability of those ways. In *United States* v. *Rio Grande Irrigation Company*, 174 U.S. 690, in which was considered the validity of the appropriation of the water of a stream by virtue of local legislation, so far as such appropriation affected the navigability of the stream, we said (p. 703):

"'Although this power of changing the common law rule as to streams within its dominion undoubtedly belongs to each State, yet two limitations must be recognized: First, that in the absence of specific authority from Congress a State cannot by its legislation destroy the right of the United States, as the owner of lands bordering on a stream, to the continued flow of its waters; so far at least as may be necessary for the beneficial uses of the Government property. Second, that it is limited by the superior power of the General Government to secure the uninterrupted navigability

of all navigable streams within the limits of the United States.

"'In other words, the jurisdiction of the General Government over interstate commerce and its natural highways vests in that Government the right to take all needed measures to preserve the navigability of the navigable watercourses of the country even against any state action.'"

See also *Missouri* v. *Illinois*, 200 U.S. 496, 520.

We submit that the quoted reasoning in *Kansas* v. *Colorado* indicates that this Court in the exercise of its original jurisdiction would give effect to a determination by the appropriate department of the Federal Government of an issue over which Congress had assumed to exercise the powers delegated to it under the Constitution. In the case at bar, therefore, it would follow that the determination by Congress (through its properly created administrative agents in the War Department, see *supra*, pp. 5-6) that the proposed Ware and Swift diversions will not obstruct navigation should be regarded in this controversy as conclusive, so far as the issue of the effect of the diversions upon navigation is concerned.

In the face of the complete regulation of the subject of navigation by Congress and in the light of the cases cited, *supra*, pp. 26-28, it is submitted that the contention in the Connecticut brief (at p. 36 *et seq.*) that Connecticut has an interest as *quasi*-sovereign in the maintenance of the navigable capacity of the Connecticut river for purely *intra*state commerce, is without merit.

C. Only the Navigability Issue is Concluded by the War Department Findings.

Massachusetts does not contend that this Court has not full jurisdiction to determine what the effect of the proposed diversions will be upon interests, other than interests of navigation, of the State of Connecticut and its citizens. Congress (and its administrative agents, the Secretary of War and the Chief of Engineers) only have power to determine what the effect of the proposed diversions will be upon navigation.

See *United States* v. *River Rouge Improvement Co.*, 269 U.S. 411, 419, and cases cited.

It by no means necessarily follows that a diversion which is innocuous so far as navigation is concerned may not cause damage to other important interests—*e.g.*, health, soil fertility, development of power, etc. We contend, however, that the diversions contemplated will have no adverse effect upon any interest of the State of Connecticut either as a proprietor or as *parens patriae*, or upon the inhabitants of Connecticut. The answer—

(*a*) by denying injury in fact to Connecticut or its inhabitants (see *supra*, pp. 2-3);

(*b*) by alleging that the proposed diversions will in fact constitute a reasonable user by Massachusetts of the waters of the Connecticut river valley (see *supra*, pp. 3-4)—properly raises issues of fact for this Court to decide; issues which have no national aspect (see *Kansas* v. *Colorado*, 206 U.S. 46, 85) and which are admittedly properly justiciable within the type of cases over which this Court as a *quasi*-international tribunal has final power. See *Kansas* v. *Colorado*, 206 U.S. 46, 95-96 *et seq.* (see *supra*, p. 28). See also *Wisconsin* v. *Illinois*, 278 U.S. 367, 409, and cases cited.

D. The Certain Benefit in Fact to the Navigability of the Connecticut River as the Result of the Storage of Water in the Swift River Valley (Particularly as Modified by the War Department Findings) Strengthens the Necessity of Giving to the War Department Decisions Conclusive Effect upon the Issue of Navigability.

The Commonwealth of Massachusetts will endeavor to prove that the limitations placed upon the diversions, both by the Massachusetts legislation and by the approval granted by the War Department, will cause an increased flow in the Connecticut river during dry seasons, when water is most needed for purposes of navigation (and incidentally for purposes of dilution of sewerage), over and above the flow which would normally occur. This will result from the release of stored waters in excess of the actual flow in the Swift river, on a considerable number of days each summer (see Answer, pars. 14, 16, 17, pp. 11, 12, 15, 19; Reprint of Answer, pp. 14-15, 22; Amended Answer, pars. 2, 3, pp. 9, 10; Appendix "C," esp. at pp. 29-30; Reprint of Answer, pp. 12-13, 99-100).

By the terms of Mass. St. 1927, c. 321, §1 (Answer, p. 49; Reprint of Answer, pp. 51-53), Massachusetts must in effect guarantee a flow in the Swift river at Bondsville, Massachusetts (below the point of proposed diversion), of twenty million (20,000,000) gallons a day, whether or not such a flow would otherwise be running in the river. By the terms of the War Department finding (Amended Answer, Appendix "C," pp. 29-30; Reprint of Answer, pp. 99-100) a further flow in the Swift river must be guaranteed by Massachusetts regardless of what the stream flow would be, were there no storage reservoir or no diversion. The War Department finds in its above-mentioned decision that when the gauge at Sunderland, Massachusetts (about twenty miles above Chicopee on the Connecticut river), shows a discharge of 4900 cubic feet per second, the

gauge at Hartford on the average shows a reading of 2.1 feet. A discharge of 4650 cubic feet per second at Sunderland corresponds to a gauge height at Hartford of 2.0 feet. The War Department decision then proceeds (Amended Answer, pp. 29-30; Reprint of Answer, pp. 99-100):

> "(e) From the studies of past records it appears there will be no substantial alteration or modification of the condition or navigable capacity of the channel of the navigable portion of the Connecticut River if the flow of water from the Swift River as provided in the terms of Chapter 321, of the Acts of 1927 (Massachusetts) be augmented during the critical period from June 1 to November 30, both inclusive, so that the measured rate of discharge on the Swift River shall be 70 cubic feet per second on such days as the United States Geological Survey gauge at Sunderland, Massachusetts indicates the discharge of the Connecticut River at that point to be less than 4900 cubic feet per second and more than 4650 cubic feet per second and shall be further augmented so that the measured rate of discharge past the impounding dam on the Swift river shall be 110 cubic feet per second on such days as the Geological Survey gauge at Sunderland, Massachusetts indicates the discharge on the Connecticut River at that point to be 4650 cubic feet per second or less."

Thus Massachusetts must guarantee a flow in the Swift river whenever certain circumstances of dry-season flow exist in the Connecticut river, regardless of the actual state of the flow of the Swift river.

The augmented flow in the Connecticut river thus required by the War Department is a flow which would not occur except for the Massachusetts project. It is a flow

furnished, at the expense of Massachusetts, in aid of navigation, in the nature of compensation for a flow taken during flood seasons, which is of no use (and indeed often a positive harm) to navigation and to the riparian owners of Connecticut land.

The action of the War Department in deciding that the project (with modifications) will not injuriously affect navigation can thus be said not only to be a waiver of all objection to the project from the standpoint of the Federal interest in the maintenance of navigation, but also to be equivalent to a positive authorization of a project to some extent of material assistance to navigation. The action of the War Department should thus, because of the determination that the project is to some extent of benefit to navigation, be given conclusive effect here so far as the issue of navigability is raised by the pleadings.

E. The Allegations both of the Original and of the Amended Answer Deny that Any Injury to Navigation is Caused by the Project. Issues of Fact are thus Raised which are Appropriate for Consideration by the Special Master Appointed by this Court; Provided that this Court should Deem it Proper, Notwithstanding the Action of the War Department, to Consider the Issue of the Effect of the Project upon Navigation.

Although Massachusetts contends that the finding of the War Department as to the effect of the project upon navigation is conclusive in this case upon that issue, it has none the less denied that the proposed diversion (either as originally contemplated or as limited by the terms of the War Department findings will in any way adversely affect navigation (Answer, pars. 14, 16, 17, 20, pp. 11, 14-15, 18, 22; Amended Answer, pars. 2-3, pp. 9, 10; Reprint of Answer, pp. 12-13, 15, 17-18, 33). In the event that this Court in its discretion should determine that the issue of navigability

is not determined by the action of the Secretary of War, pleaded fully by Massachusetts and, therefore, admitted by Connecticut for the purpose of preliminary motions (such as the present motions of Connecticut raising questions of law solely upon technical admissions of fact made by motions in the nature of demurrers to the answer); it is submitted that the defendant's answer as amended raises sufficient issues of fact upon the question of navigability to make it necessary for this Court to submit the case to the Special Master for the purpose of obtaining adequate findings of fact in accordance with its usual custom.

See, *e.g.*, *Kansas* v. *Colorado*, 185 U.S. 125, esp. 146-147; 206 U.S. 46, esp. 99-100 *et seq.*
Wisconsin v. *Illinois*, 270 U.S. 634; 278 U.S. 367, 370.

II.

THE LAW APPLICABLE TO THE CASE AT BAR IS TO BE DETERMINED BY THIS HONORABLE COURT IN THE LIGHT OF THE WHOLE SITUATION OF FACT: HAVING DUE REGARD TO THE DECISIONS OF THIS COURT IN OTHER INTERSTATE CASES, TO THE MUNICIPAL LAW IN FORCE IN MASSACHUSETTS AND CONNECTICUT, TO PERTINENT PROVISIONS OF INTERNATIONAL LAW AND PRACTICES, AND TO THE CUSTOMARY METHODS OF OBTAINING AND USING WATER IN THE TWO STATES HERE INVOLVED. NO ONE OF THESE FACTORS IS ALL IMPORTANT.

The contentions of Connecticut upon the present motions fall roughly into three groups (see analyses, *supra*, pp. 7-10):

1. Connecticut's contentions as to the legality of the proposed diversion so far as concerns the public interest in the maintenance of navigation. These contentions we have discussed *supra*, pp. 14-35.

2. Connecticut's contentions that the proposed diversion, or any similar diversion regardless of its extent, would be illegal as involving an invasion of the sovereign rights of Connecticut under riparian law and under the *quasi*-international law applied in interstate disputes by this Court.

3. Connecticut's contentions that the facts set up in the answer which tend to show that Connecticut is not damaged and that Boston is facing a severe emergency are immaterial—and that such facts cannot properly be considered by this Court even as the basis of equitable defenses.

This Court has in past decisions indicated the basis upon which it will determine the principles of law applicable to a controversy such as this between two *quasi*-sovereign States. Apart from the issues of navigability, we submit that this Honorable Court should give some force and effect to each of the following factors:

1. Principles laid down by this Honorable Court in other interstate cases involving the use of interstate streams;

2. International and interstate practices and precedents as to the use of international and interstate streams;

3. The theory and the practical application of riparian and water law in the two contending States, particularly so far as domestic water supplies are concerned; as revealed not only by the decided cases, but also by the legislative policy of the States as expressed in general and special acts.

4. The necessity of expanding and developing the existing principle of international law giving a priority of right to make use of water for domestic purposes as compared to the use of the same water for other purposes.

A. The Municipal Riparian Law of Connecticut and Massachusetts is Not Controlling. It is merely One Element of the Law of this Case.

It is not disputed by Massachusetts that Connecticut has a standing as *parens patriae* to raise for the determination of this Court issues (other than issues concerning navigability) with respect to the effect of the proposed Massachusetts diversions. This right of the State to sue in behalf of its own proprietary interests and the general welfare of its people is established by many decisions of this Court.

> *Kansas* v. *Colorado*, 185 U.S. 125, 141 *et seq.*; 206 U.S. 46, 80 *et seq.*
> *Missouri* v. *Illinois*, 180 U.S. 208, 241; 200 U.S. 496, 519.
> *New York* v. *New Jersey*, 256 U.S. 296, 302.
> *North Dakota* v. *Minnesota*, 263 U.S. 365, 372 *et seq.*
> *Wisconsin* v. *Illinois*, 278 U.S. 367, 409, and cases cited.

This Court not only has not consistently applied the law of any particular jurisdiction to interstate controversies involving the use of water of interstate streams, but it has studiously avoided tying its hands for the future by more than a determination of the guiding principle applicable to the case before it upon the particular facts actually before it for consideration. The doctrine of the decisions is perhaps best expressed in the language of Mr. Chief Justice *Fuller* in *Kansas* v. *Colorado*, 185 U.S. 125, at pp. 146-147:

> "Sitting, as it were, as an international, as well as a domestic tribunal, we apply Federal law, state law, and international law, as the exigencies of the particular case may demand, and we are unwilling, in this

case, to proceed on the mere technical admissions made by the demurrer."

This Court has recognized that an interstate controversy of this nature "rises . . . above a mere question of local private right and involves a matter of state interest, and must be considered from that standpoint" (Mr. Justice *Brewer* in *Kansas* v. *Colorado*, 206 U.S. 46, at 99). In the case last cited the Court goes on, at page 100, to discuss the situation before it as it would be if involving solely individual riparian proprietors. In that case the Court said:

> "The question would be one of legal right, narrowed to place, amount of flow and freedom from pollution.
>
> "We do not intimate that entirely different considerations obtain in a controversy between two States. Colorado could not be upheld in appropriating the entire flow of the Arkansas River, on the ground that it is willing to give, and does give, to Kansas something else which may be considered of equal value. That would be equivalent to this court's making a contract between the two States, and that it is not authorized to do. But we are justified in looking at the question not narrowly and solely as to the amount of the flow in the channel of the Arkansas River, inquiring merely whether any portion thereof is appropriated by Colorado, but we may properly consider what, in case a portion of that flow is appropriated by Colorado, are the effects of such appropriation upon Kansas territory."

This language, together with other language found at pages 96-97 of the same opinion, shows the breadth of view taken by this Court when deciding important interstate disputes, which, in the case of completely independent sovereign States, would be settled either by diplomacy or by resort to war. It is, of course, true that the law of the

States involved is one of the elements given consideration by this Court in such disputes.

See, *e.g.*, *Wyoming* v. *Colorado*, 259 U.S. 419, 458, 464 *et seq.*
Kansas v. *Colorado*, 206 U.S. 46, 94.

There is ample authority to the effect that the local law in force in either State is not conclusive, when this Court is acting in its *quasi*-international capacity.

See, *e.g.*, Mr. Justice *Holmes* in *Missouri* v. *Illinois*, 200 U.S. 496, 519-520:

> "The Constitution extends the judicial power of the United States to controversies between two or more States and between a State and citizens of another State, and gives this court original jurisdiction in cases in which a State shall be a party. Therefore, if one State raises a controversy with another, this court must determine whether there is any principle of law and, if any, what, on which the plaintiff can recover. But the fact that this court must decide does not mean, of course, that it takes the place of a legislature. Some principles it must have power to declare. For instance, when a dispute arises about boundaries, this court must determine the line, and in doing so must be governed by rules explicitly or implicitly recognized. *Rhode Island* v. *Massachusetts*, 12 Pet. 657, 737. It must follow and apply those rules, even if legislation of one or both of the States seems to stand in the way. *But the words of the Constitution would be a narrow ground upon which to construct and apply to the relations between States the same system of municipal law in all its details which would be applied between individuals.* If we suppose a case which did not fall within the power of Congress to regulate, the result of a declaration of rights by this court would be the estab-

> lishment of a rule which would be irrevocable by any power except that of this court to reverse its own decision, an amendment of the Constitution, or possibly an agreement between the States sanctioned by the legislature of the United States." (Italics ours.)

Broader principles than the municipal riparian law of Connecticut and of Massachusetts are therefore applicable to this cause. This is a controversy between *quasi*-sovereign States. To a very great extent the issues in this case are *quasi*-international, and the rights of the parties are fixed by international law. The Chief Justice of this Honorable Court, in a discussion of a proposed world court some years ago, phrased this principle as follows:

> "A court to administer international justice is not new. Our own Supreme Court is one. Questions arise between states not settled by the Federal Constitution or Federal statutes. In the Kansas-Colorado case, Congress had no power to control Colorado. International law alone fixed the rights between the states and the Supreme Court enforced these rights."
>
> *Hon. William H. Taft*, "Papers on the League of Nations," p. 99.

The issue in the case at bar, we submit, calls for the application of international law principles of the same sort as those which controlled the decision of the International Commission which approved the application of the City of Winnipeg for permission to divert water from a tributary of the Lake of the Woods, an international water (see *infra*, pp. 58-59).

Municipal law enters into international law as one of the elements or standards by which the obligation of a sovereign to do equity to another sovereign is measured.

See, *e.g.*, *Kansas* v. *Colorado*, 206 U.S. 46, 102-105.
Wyoming v. *Colorado*, 259 U.S. 419, 466-467.

It is not, we submit, the only element which will be considered by this Court. In the past this Court has said that it will consider precedents, treaties, and other authorities in international law.

Kansas v. *Colorado*, 185 U.S. 125, 146-147.

It has applied a modified form of international law in interstate controversies—

Missouri v. *Illinois*, 200 U.S. 496, 518-522;
Alabama v. *Georgia*, 23 How. 505, 513;
Nebraska v. *Iowa*, 143 U.S. 359, 361-368 (in which international law authorities were treated as decisive of the case);
Louisiana v. *Mississippi*, 202 U.S. 1, 25, 49-52;
See *Arkansas* v. *Tennessee*, 246 U.S. 158, 172-174—

except, of course, where, under the Constitution of the United States, Federal law is supreme.

See, *e.g.*, *Wisconsin* v. *Illinois*, 278 U.S. 367 (navigation).
Pennsylvania v. *West Virginia*, 262 U.S. 553, 595 *et seq.* (interstate commerce).

This Court also has given great weight to commercial and economic practices with respect to matters similar to those in issue in the territory affected by the particular controversy.

See, *e.g.*, *Missouri* v. *Illinois*, 200 U.S. 496, 521-522.
Kansas v. *Colorado*, 206 U.S. 46, 101, 105 *et seq.*
Wyoming v. *Colorado*, 259 U.S. 419, 466 *et seq.*

Compare the consideration given to the practical situation in the light of the best scientific knowledge available, in *New York* v. *New Jersey*, 256 U.S. 296, 309 *et seq.*

The willingness of this Honorable Court to examine not only the technical rules of law in force in each State, but also the prevailing practice as to the use of streams in the community, is pointed out by Mr. Justice *Holmes* in *Missouri* v. *Illinois*, *supra*, at pp. 521-522:

> "As to the principle to be laid down the caution necessary is manifest. It is a question of the first magnitude whether the destiny of the great rivers is to be the sewers of the cities along their banks or to be protected against everything which threatens their purity. To decide the whole matter at one blow by an irrevocable fiat would be at least premature. If we are to judge by what the plaintiff itself permits, the discharge of sewage into the Mississippi by cities and towns is to be expected. We believe that the practice of discharging into the river is general along its banks, except where the levees of Louisiana have led to a different course. The argument for the plaintiff asserts it to be proper within certain limits. These are facts to be considered. Even in cases between individuals some consideration is given to the practical course of events. In the black country of England parties would not be expected to stand upon extreme rights. *St. Helen's Smelting Co.* v. *Tipping*, 11 H. L. C. 642. See *Boston Ferrule Co.* v. *Hills*, 159 Massachusetts, 147, 150. Where, as here, the plaintiff has sovereign powers and deliberately permits discharges similar to those of which it complains, it not only offers a standard to which the defendant has the right to appeal, but, as some of those discharges are above the intake of St. Louis, it warrants the defendant in demanding the strictest proof that the plaintiff's own conduct does

not produce the result, or at least so conduce to it that the courts should not be curious to apportion the blame."

We submit, therefore, upon the authorities cited, that it is clear that the municipal law of the two States is not the only basis of legal principle upon which this cause will be decided; and that the Court will give due regard to the economic requirements of the two States involved; to principles, established by this Court and by international law, of equitable division of the benefits of the waters of interstate and international rivers as between States; and to geographical facts which require the adoption of the principle that a claim for the use of water for drinking and domestic purposes is to be given consideration ahead of a claim to use potable water for any other purpose, so long as the Federal interest in the maintenance of navigation is not injured. We further submit that until the facts of this case are found by the Master (appointed December 2, 1929), this Honorable Court will not be in a position to decide how much weight is to be given to each of the elements mentioned in determining the law applicable to the cause.

B. The Decisions of this Court Establish the Principle of the Equitable Division of the Benefits Arising from an Interstate River among the States through which the River Passes.

Massachusetts contends that this Honorable Court has consistently recognized that a *quasi*-sovereign State may make use of its fair share of the benefits accruing from the presence of a portion of an interstate river within its borders. That use must be reasonable in the light of local conditions of terrain, geography, and rainfall. It must have due regard to commercial and business custom in the

community as to the use of water. It is influenced in part by local municipal law. None the less, we submit that this Court has uniformly, in the exercise of its interstate jurisdiction, laid down a principle that under all the circumstances each State bordering upon an interstate stream is entitled to make what is substantially a permanent abstraction of a portion of the waters or of the beneficial use of the stream, providing the abstraction does not exceed the amount to which the State, as a *quasi*-sovereign, is entitled by international law as its share under an equitable division of the waters of the stream. Chronologically, the principal decisions are as follows:

Missouri v. *Illinois.*

Missouri v. *Illinois*, 180 U.S. 208 (1901). This was a bill in equity seeking to enjoin the discharge of Chicago's sewerage into the Mississippi river by means of the Sanitary Canal. Upon demurrer to the bill, this Honorable Court decided (1) that the bill presented a justiciable controversy under the Constitution and (2) that the allegations of the bill, if found to be true, might warrant equitable relief to restrain the commission. The demurrers were overruled and leave was given to file answers to the bill. In 200 U.S. 496 (1906), the Court considered the testimony taken as to the effect of the Illinois project, which in substance was a permanent appropriation by Illinois of a portion of the potential beneficial use of the Mississippi watershed for the purpose of sewerage dilution. The Court first determined that there was no superior Federal right (*e.g.*, navigation) involved (at pp. 518-520). It then determined that the Court must under the Constitution decide whether the conduct of Illinois was a proper exercise of sovereign right, which did not impinge on the equal sovereign rights of Missouri. That the decision must rest upon no narrow application of a local system of municipal

law was clearly set forth by Mr. Justice *Holmes* at pp. 419-421, and it is there suggested that the principles of international law are of guiding force. The Court, relying on the common practice of making use of the Mississippi and its tributaries for sewerage purposes, judged Missouri by the standards she employed within her own borders (at pp. 521-522) and found that the evidence did not clearly establish the commission of a nuisance by Illinois (at pp. 523-526). In accordance with the principle stated in the opinion (at pp. 520-521), the Court decided that the alleged injury was not sufficiently serious to justify equitable relief against a sovereign State.

The decision was in substance a holding by this Court that Illinois had not made use of the stream in excess of its equitable share of the beneficial use of the waters. The case, when analyzed, involves an application of the principle of equitable division of beneficial user.

Kansas v. *Colorado.*

Kansas v. *Colorado*, 185 U.S. 125 (1902); 206 U.S. 46 (1907). This was a bill in equity brought by Kansas to enjoin the permanent diversion of water from the Arkansas river by Colorado for the purpose of irrigation. Upon demurrer the Court decided that the case presented a justiciable interstate controversy (at p. 145), but declined to "proceed on the mere technical admissions made by the demurrer" to a decision of the case upon its merits, in view of the fact that the applicable law depended upon the "exigencies of the particular case" (at p. 147). The demurrer was overruled. After the taking of testimony, this Court considered the case upon its merits (206 U.S. 46). The decision affirmed the jurisdiction of the Court to decide the controversy as rising "above a mere question of local private right" and as "a matter of state interest" (at p. 99), which must be determined upon a broad consider-

ation of all the geographical, natural, and economic circumstances. The Court devoted some pages (pp. 95 *et seq.*) to the discussion of the law applicable to the case. The following language, beginning at p. 97, seems to indicate beyond the shadow of a doubt that the Court believed that it was bound to apply in the case the principles of international law:

> "As Congress cannot make compacts between the States, as it cannot, in respect to certain matters, by legislation compel their separate action, disputes between them must be settled either by force or else by appeal to tribunals empowered to determine the right and wrong thereof. Force under our system of Government is eliminated. The clear language of the Constitution vests in this court the power to settle those disputes. We have exercised that power in a variety of instances, determining in the several instances the justice of the dispute. Nor is our jurisdiction ousted, even if, because Kansas and Colorado are States sovereign and independent in local matters, the relations between them depend in any respect upon principles of international law. *International law is no alien in this tribunal.* In *The Paquete Habana*, 175 U.S. 677, 700, Mr. Justice Gray declared:
>
> "'International law is part of our law, and must be ascertained and administered by the courts of justice of appropriate jurisdiction, as often as questions of right depending upon it are duly presented for their determination.'
>
> * * * * * * * *
>
> "One cardinal rule, underlying all the relations of the States to each other, is that of *equality of right*. Each State stands on the same level with all the rest. It can impose its own legislation on no one of the others, and is bound to yield its own views to none.

> Yet, whenever, as in the case of *Missouri* v. *Illinois*, 180 U.S. 208, the action of one State reaches through the agency of natural laws into the territory of another State, the question of the extent and the limitations of the rights of the two States becomes a matter of justiciable dispute between them, and this court is called upon to settle that dispute in such a way as will recognize *the equal rights of both* and at the same time establish justice between them. In other words, through these successive disputes and decisions this court is practically building up what may not improperly be called *interstate common law*. . . . Surely here is a dispute of a justiciable nature which must and ought to be tried and determined. If the two States were absolutely independent nations it would be settled by treaty or by force. Neither of these ways being practicable, it must be settled by decision of this court." (Italics ours.)

The Doctrine of Equitable Division Applied.

In view of the fact that "Kansas . . . recognizes the right of appropriating the waters of a stream for the purposes of irrigation, subject to the condition of an *equitable* division betwen the riparian proprietors" (at p. 104), the Court denied specific relief inasmuch as the evidence failed to show that under all the applicable circumstances Colorado had permanently taken more than her fair share of the waters of the river or had done any act which worked substantial detriment to the States lower on the river (at p. 117). The Court, however, in reaching its conclusions, did not even purport to apply "the extreme rule of the common law" (at p. 105), but based its decision upon a consideration of (at p. 100) "the effect of what has been done upon the conditions in the respective States," and so adjusted "the dispute upon the basis of equality of rights

as to secure as far as possible to Colorado the benefits of irrigation without depriving Kansas of the like beneficial effects of a flowing stream." Clearly, the decision was based upon the principle of international law of equitable division of the benefits of a flowing stream subject to be appropriated as between the States having an interest in the stream. Upon no other basis can be explained the action of the Court (at pp. 113-114) in weighing the benefit to Colorado and the amount of detriment to Kansas caused by the diversion there in question. Similar language appears at p. 117, where the Court clearly points out that its guiding principle is "an equitable division of benefit" of the waters of the Arkansas as between the two States.

Equitable Division of Potential Sewage Dilution Capacity.

New York v. *New Jersey*, 256 U.S. 296 (1921), is not a case dealing with the use of an interstate stream. It does, however, deal with the claim of one State to appropriate permanently part of the beneficial use to be derived from water in which another State had some territorial interest. New York in this case sought to enjoin the Passaic Valley Sewerage project under which New Jersey proposed to dispose of the sewerage of certain cities, including Paterson and Newark, by discharging the sewerage into Upper New York Bay. The Court, after the taking of testimony, considered the case upon its merits. Jurisdiction of the cause under the Constitution was sustained on the authority of *Missouri* v. *Illinois*, 180 U.S. 208, 241, inasmuch as New York was suing in its capacity of *parens patriae* as a *quasi*-sovereign. The Court then went on to consider the evidence introduced (at p. 309)—

> ". . . subject to the rule that the burden upon the State of New York of sustaining the allegations of its bill is much greater than that imposed upon a complainant in an ordinary suit between private parties.

> Before this court can be moved to exercise its extraordinary power under the Constitution to control the conduct of one State at the suit of another, the threatened invasion of rights must be of serious magnitude and it must be established by clear and convincing evidence. *Missouri* v. *Illinois*, 200 U.S. 496."

Upon the whole situation, and after a consideration of all the circumstances, the Court denied an injunction on the ground that New York had not made out its case to be one of sufficient seriousness to warrant intervention of the Court (at p. 313), which, of course, was acting as a *quasi*-international tribunal. We submit that the decision is in effect a holding that New Jersey could not be said to have made an appropriation of more than her equitable share of the sewerage dilution capacity of the waters of Upper New York Bay, a body of water in which both States had an interest.

Wyoming v. *Colorado.*

Wyoming v. *Colorado*, 259 U.S. 419 (1922), was a case involving a diversion by Colorado of certain of the upper waters of the Laramie river, which flows from Colorado into Wyoming. The latter State sought an injunction of such diversions in Colorado as were subsequent in time to certain Wyoming diversions and as constituted an inequitable use of the waters of the stream. Much evidence was heard in the case (see p. 456), and the Court had the benefit of three exhaustive arguments, in which not only the whole geographical and economic situation was brought to its attention, but during which, also, it had before it both international and local precedents in similar cases (see esp. pp. 425-427, 431, 434-438). The Court examined at length the whole situation of fact in the light of the history of the area affected by the controversy; it considered the uses to which water had been put in the two States both in

pioneer days and after their admission as States; it considered the system of water law under which settlers in both States had turned arid desert into fertile agricultural land. From this examination the Court came to the conclusion that the *quasi*-international law principle of equitable division of use between States demanded the application of a standard in the particular controversy not unlike the appropriation theory of water rights in force in each State party to the suit (at p. 470). In this instance, therefore, sound interstate and international law dictated a "doctrine of appropriation as . . . the only basis which is consonant with the principles of right and equity applicable to such a controversy," in the light of the whole background of the case. Applying this principle, the Court examined with great care each of the claimed appropriations in each State, classified them as to priority, and by its decree permitted Colorado to continue only so much of the diversions sought to be enjoined as could be held to be proper and reasonable in view of the principle which in the particular case was deemed to result in an equitable division of the beneficial user of the stream as between the two States.

The North Dakota Case.

North Dakota v. *Minnesota*, 263 U.S. 365 (1923), involved the use by Minnesota of waters lying within its borders in such a way as to affect to some degree the amount of water in a watercourse bordering upon both States. North Dakota brought a bill in equity seeking to enjoin the operation of a drainage ditch in Minnesota which was alleged so to increase the flow into an interstate stream as to cause water to be thrown upon lands in North Dakota to their damage. The case was heard upon the facts at great length, and after the final argument to the Court upon the merits of the cause the bill was dismissed without prejudice, in an opinion by the Chief Justice. This Court

readily sustained the general jurisdiction of the Court to decide the controversy (at p. 372), in the following language:

> "The jurisdiction and procedure of this Court in controversies between States of the Union differ from those which it pursues in suits between private parties. This grows out of the history of the creation of the power, in that it was conferred by the Constitution as a substitute for the diplomatic settlement of controversies between sovereigns and a possible resort to force. The jurisdiction is therefore limited generally to disputes which, between States entirely independent, might be properly the subject of diplomatic adjustment. They must be suits 'by a State for an injury to it in its capacity of quasi-sovereign. In that capacity the State has an interest independent of and behind the titles of its citizens, in all the earth and air within its domain.' 'When the States by their union made the forcible abatement of outside nuisances impossible to each, they did not thereby agree to submit to whatever might be done. They did not renounce the possibility of making reasonable demands on the ground of their still remaining quasi-sovereign interests; and the alternative to force is a suit in this court.'"

The Court then pointed out that—

> "In such action by one State against another, the burden on the complainant State of sustaining the allegations of its complaint is much greater than that imposed upon a complainant in an ordinary suit between private parties. 'Before this court can be moved to exercise its extraordinary power under the Constitution to control the conduct of one State at the suit of another, the threatened invasion of rights must be of

> serious magnitude and it must be established by clear and convincing evidence.' "

And further, that—

> "The right of a State as *parens patriae* to bring suit to protect the general comfort, health, or property rights of its inhabitants threatened by the proposed or continued action of another State, by prayer for injunction, is to be differentiated from its lost power as a sovereign to present and enforce individual claims of its citizens as their trustee against a sister State" (pp. 375-376).

The opinion then goes on to consider the whole case in the light of the scientific, economic, historical, and geographical data adduced in evidence, and came to the conclusion (at p. 388) that Minnesota was not responsible for the floods complained of. This, we submit, was in substance a decision that Minnesota had not taken more than her fair and equitable share of the potential beneficial use of the waters and watercourses of an interstate watershed.

The Drainage Canal Case.

Wisconsin v. *Illinois*, 278 U.S. 367 (1929), rested largely upon the decision of questions by an application of Federal law governing the control of navigable waters. That aspect of the case has been discussed fully *supra*, at pp. 16-19. At the same time the question of whether Illinois and the Sanitary District of Chicago had made an inequitable use of the waters of the Great Lakes, without due regard to the rights of other riparian States to make an equitable use of the lakes, was present in the case. Upon the facts and the exhaustive report of the Special Master the Court found that the diversions by Chicago were not proper, largely because they were in excess of the water

which could be taken without injury to the navigable capacity of the lakes. This fact alone made it so clear that Illinois was taking more water than it had any just claim to, either under any principle of equitable division or under the Federal law applicable to navigable waters, that the point was not considered at length by this Court (see pp. 417-419). The case, however, casts no doubt upon the validity of the principle of equitable division of the beneficial user of interstate waters as between interested States, in any case where no superior Federal right, such as navigation, is involved.

Recommendations of Special Master for a Decree Recognize Prior Claim of Water Supply.

It should be noticed, however, in passing, that the report of the Special Master in the *Chicago* case, recommending a form of final decree, casts no doubt upon the equity of Chicago's claim to divert sufficient water from the lakes for domestic uses of drinking, washing, and the like. By the terms of that recommendation, recently announced (Report of the Special Master on Re-Reference, pp. 120, 143, and 147 *et seq.*), the diversion requirements of the domestic water supply of Chicago are to be met as a claim upon the waters of the lakes even ahead of the requirements of navigation. Further diversions under the proposed decree would be permitted only in the light of the necessities of navigation. The parties to the *Chicago* case, the Special Master, successive Secretaries of War, and this Honorable Court (so far as it has had occasion to consider the point *sub silentio*), apparently have felt no doubt that the claim of Chicago to a reasonable diversion for a domestic water supply was to some extent a prior lien upon the waters of the lakes, entitled to great respect unless expanded to grossly unreasonable limits. Such a doctrine of priority of claim in behalf of municipal water supplies has been

recognized in international agreements and by commentators on international law (see *infra*, pp. 55-61). It is written into the statute law of the two States involved in this controversy (see *infra*, pp. 68-79). It is significant that it is recommended by the Special Master in the *Chicago Drainage* case as an essential feature of the adjustment of an interstate controversy before this Court sitting under the Constitution as a *quasi*-international tribunal.

C. International Law Establishes the Principle of Equitable Division of the Benefits of Interstate Waters as between the Sovereigns through whose Lands the Waters Pass. In Making an Equitable Division of Beneficial Use, Due Weight Must be Given to the Comparative Benefit to be Derived by Each Sovereign from Each Particular Use. The Fundamental and Most Important Use of Water is for Quenching Thirst and for Other Domestic Purposes.

We have contended above (*supra*, pp. 37-43) that this Court applies international law whenever it is appropriate for the settlement of controversies between the *quasi*-sovereign States of the Union. The decisions cited show that precedents of action in international disputes are regarded by this Court as of great value as standards in the decision of litigation between the States. In the matter of the equitable division of interstate waters as between nations, international precedents and authorities are available which are of assistance in a cause like this, so far as the relation between two States of the United States is analogous to the relation between two nations of the world. The States in the American Union have a special position by reason of their federation. Yet the analogy between the American States and independent nations is a close one, and therefore the law of nations affords close analogies in dealing with any interstate controversy.

There is now a great body of international law concerning international rivers and other international waters, which may be drawn upon for analogies to be applied in the interstate law of waters within the United States. There are numerous rivers in the world which may be said to be international in the sense that they separate or traverse the territories of more than one State. Among the notable examples of rivers international in this sense are the Danube, the Rhine, the Elbe, the Oder, the Pruth, the Po, the Scheldt, the Nile, the Congo, the Zambesi, the Vistula, the Amazon, the Orinoco, the Rio de la Plata, the Rio Grande, the St. Lawrence, the Yukon, the Porcupine, the Stikine, the St. John, the Columbia; and during the course of the past century an elaborate body of international law has been developed with reference to these rivers.

The chief interest in international rivers during the past century was in reference to their navigation. Hence most of the international law which has been developed has to do with problems of navigation. Numerous treaties have been made, the principal object of which is to protect the common interest of States in the navigation of streams. So numerous have these treaties been, and so general is their scope, that there may now be said to be a body of international law which exists apart from any basis to be found in particular treaties.

Of course, so far as the *issues of navigation* in the case at bar are concerned, the principles established by international law are of slight assistance, inasmuch as, under the Constitution, the control of navigable waters is vested almost entirely in Congress and in those to whom Congress has delegated authority. However, to the extent that international treaties and decisions regarding freedom of navigation of international waters attempt to apply the doctrine of equitable distribution of the benefits of the navigable capacity of such waters, those authorities strengthen the doctrine which this Court has (as we have

argued *supra*, pp. 43-54) applied consistently in interstate litigation.

The Development of International Law as to Uses of Water.

While most of the international law relating to international streams has been developed with reference to problems connected with their navigation, in recent years the waters of such streams have been put to many other uses. Water is now used more and more extensively for domestic purposes such as drinking, for sanitation purposes such as the disposal of sewage, for agricultural purposes such as irrigation, for industrial purposes such as the generation of electrical power, and for other purposes unconnected with navigation. We have collected in Appendix "A" (*infra*, pp. 91-99) a number of international precedents showing the principle of equitable division as it has been stated by commentators and as it has been applied through various methods in the adjustment of international and interstate disputes. Those precedents which bear most directly upon the issues now before this Honorable Court, we shall summarize briefly here. Perhaps the most striking examples of international provision for the use of the waters of a stream are to be found in the practice of the United States, which may be studied with reference to common waters of the United States and Mexico, and to common waters of the United States and Canada.

The Priority Doctrine Recognized.

The development of our relations with Canada has frequently called for provisions concerning the diversion of certain boundary waters. By the convention of January 11, 1909, certain waters are defined as "boundary waters" and an International Joint Commission was created with jurisdiction over cases involving the use or obstruction or diversion of certain waters. Article 8 of this convention

provides principles which are to guide the International Joint Commission, among which are the following:

> "The High Contracting Parties shall have, each on its own side of the boundary, equal and similar rights in the use of the waters hereinbefore defined as boundary waters.
>
> "The following order of precedence shall be observed among the various uses enumerated hereinafter for these waters, and no use shall be permitted which tends materially to conflict with or restrain any other use which is given precedence over it in this order of precedence:
>
> "(1) Uses for domestic and sanitary purposes;
>
> "(2) Uses for navigation, including the service of canals for the purposes of navigation;
>
> "(3) Uses for power and for irrigation purposes.
>
> "The foregoing provisions shall not apply to or disturb any existing uses of boundary waters on either side of the boundary.
>
> "The requirement for an equal division may in the discretion of the Commission be suspended in cases of temporary diversions along boundary waters at points where such equal division can not be made advantageously on account of local conditions, and where such diversion does not diminish elsewhere the amount available for use on the other side" (36 STAT. AT L., 2448).

Preference to Municipal Water Supplies.

In this treaty expressly appears not only a clear recognition of the doctrine of the equitable division of the beneficial user of international waters, but also a straightforward declaration that preference is to be given to a nation desiring to use water for domestic purposes over a nation desiring to use water for some less fundamental cause. A similar recognition of the prior claim of a domestic water supply

is to be found in the recommendations for a final decree recently filed by the Special Master in the *Chicago Drainage Canal* case (see *supra*, p. 53).

One interesting controversy has arisen under the treaty of January 11, 1909 (just quoted above), the decision of which clearly recognizes the prior importance of the use of water for domestic purposes. The International Joint Commission established under the treaty handed down an opinion on January 14, 1914, concerning the application of the Greater Winnipeg Water District for the diversion and use of water from Shoal Lake and the Lake of the Woods. Shoal Lake is a tributary of the Lake of the Woods, a boundary water under the treaty. Winnipeg desired to make the diversion for domestic and sanitary purposes. The Greater Winnipeg Water District obtained the permission of the Province of Ontario, in which Shoal Lake is situated, to make such use of the water. The War Department of the United States entered an appearance before the Commission and stated that "the War Department feels that the proposed diversion by the Winnipeg Water District is so small a factor of the general problem as to be practically insignificant, and that no valid reason exists for objecting to its consummation." The town of Kenora, Ontario, however, opposed the diversion on the ground that it would lower the level of the Lake of the Woods and contended that other water was available to Winnipeg.

After thorough investigation the Commission found that the diversion was "not of any great moment" and approved the application. Its conclusion is as follows:

> "To sum up, we believe that it is absolutely necessary for the city of Winnipeg and the Greater Winnipeg Water District, the applicant, to obtain a sufficient supply of good, pure, and wholesome water; that after examining the available sources of supply, the applicant has shown that the best source, the cheapest, the

most abundant, and the purest is Shoal Lake; that the diversion of the waters of Shoal Lake and the resultant decrease of the flow of the waters of the Lake of the Woods at the outlet of the lake, is, for the present at least, practically unimportant, and without any effect upon the industries and plants established at Kenora, and, finally, that the granting of the privilege of taking the waters of Shoal Lake has been surrounded by such safeguards that all the interests are amply protected."

An agreement between the United States and Canada was signed at Washington, February 24, 1925, for regulating the level of the Lake of the Woods. Article 2 of the agreement states its object to be to secure "the most advantageous use of the waters" for "domestic and sanitary purposes, for navigation purposes, for fishing purposes, and for power, irrigation and reclamation purposes." This agreement dealing only with one particular body of water clearly recognizes not only the principle of equitable division but also the prior claim of a domestic water supply upon the waters of an international lake (see 44 STAT. AT L., 2108).

A Pending Equitable Division.

Preparatory work for a similar arrangement with Mexico, based upon the principle of equitable division, is now in progress under the authority of the Act of May 13, 1924, 43 STAT. AT L., Part I, p. 118, entitled:

> "An Act Providing for a study regarding *the equitable use* of the waters of the Rio Grande below Fort Quitman, Texas, in co-operation with the United States of Mexico." (Italics ours.)

Section 1 reads in part:

> "The President is hereby authorized to designate three special commissioners to co-operate with repre-

sentatives of the United States of Mexico in a study regarding the equitable use of the waters of the Rio Grande below Fort Quitman, Texas, with a view to their proper utilization for irrigation and other beneficial uses. One of the commissioners so appointed shall be an engineer experienced in such work. Upon completion of such study the results shall be reported to Congress."

Foreign Interstate Litigation Precedents.

Courts, other than this Honorable Court, have seldom been called upon to deal with questions relating to the division of waters between States. But the jurisprudence of the Federal Tribunal of Switzerland affords some interesting cases. In 1878 the Canton of Argovie sought to restrain the Canton of Zurich from putting into effect certain concessions which would involve the damming of the river Johenbuch, which flowed from the territory of Zurich into the territory of Argovie. The Federal Tribunal found itself competent, but dismissed the application, on the ground that equality between the cantons did not exclude the common use of the waters and did not necessitate an undiminished or uninterrupted flow of the water (*Arrêts du Tribunal Federal Suisse*, IV, p. 34). The same principle was followed in *Canton of Argovie* v. *Canton of Soleure*, *Arrêts du Tribunal Federal Suisse*, XVIII, p. 689.

Summary—Equitable Division is the Guiding Principle.

The recent developments of treaty law on the subject of the use of waters in an international stream is clearly based on an effort to assure to the States concerned an equitable division of the waters, and we submit that the principle may be said to have become established that even in the absence of conventional agreement an equitable division may be made, so that each State through whose territory a stream

flows may make an equitable use of the water. A tendency is clearly manifest, also, to distinguish between various uses which may be made of water. The hierarchy of uses will depend largely on the locality and on the special conditions prevailing with respect to the particular stream. In some cases, navigation is to be put first, perhaps; but it is significant that under some treaties it is provided that other uses should be given precedence, and that the Convention of 1909 between the United States and Canada puts before navigation "uses for domestic and sanitary purposes." No more satisfactory classification of uses can be found than in the 1909 convention, and it is significant that that classification is followed in the enumeration in the *Lake of the Woods Agreement of 1925* (see *supra*, p. 59).

In the Connecticut river watershed, of course, there can be no question of interference with navigation, in view of action taken by the War Department. It is merely a question of the propriety and equitable nature of the use being made by Massachusetts for domestic purposes.

D. Under the Municipal Law both of Connecticut and of Massachusetts, so far as it Furnishes an Analogy of Weight in this Case, the Massachusetts Project would be Deemed Reasonable.

1. Under the riparian law in force both in Massachusetts and in Connecticut a riparian owner is entitled to make a reasonable use of the waters flowing past his land, having due regard for the interests of upper and lower riparian owners upon the same stream.

The general common-law rule as to the rights of riparian owners, as in force in Massachusetts, has been stated as follows:

> "The right of each riparian owner is to have the natural flow of the stream come to his land and to

make a reasonable and just use of it as it flows through his land, subject, however, to the like right of each upper proprietor to make a reasonable and just use of the water on its course through his land and subject further to the obligation to lower proprietors to permit the water to pass away from his estate unaffected except by such consequences as follow from reasonable and just use by him."

Stratton v. *Mount Hermon Boys' School*, 216 Mass. 83, 85 (see cases cited).

See *Taft* v. *Bridgeton Worsted Co.*, 237 Mass. 385, 388.

Collins Mfg. Co. v. *Wickwire Co.*, 14 Fed. (2d) 871, 872.

Parker v. *American Woolen Co.*, 195 Mass. 591, 598-599.

Mason v. *Whitney*, 193 Mass. 152, 158.

McNamara v. *Taft*, 196 Mass. 597, 599.

Isbell v. *Greylock Mills*, 231 Mass. 233, 236.

Parker v. *Griswold*, 17 Conn. 288, 299.

Stamford Extract Mfg. Co. v. *Stamford Rolling Mills Co*., 101 Conn. 310, 320.

Buddington v. *Bradley*, 10 Conn. 212.

What constitutes a reasonable use is purely a question of fact, involving an application of the legal principle above stated to the situation presented before the court.

Elliot v. *Fitchburg R.R.*, 10 Cush. 191, 195.

Mason v. *Whitney*, *supra*.

Parker v. *American Woolen Co.*, *supra*.

McNamara v. *Taft*, *supra*, at p. 599.

Roach v. *Sturdy*, 250 Mass. 357, 358-359.

Hazard Powder Co. v. *Somersville Mfg. Co.*, 78 Conn. 171.

Keeney & Wood Mfg. Co. v. *Union Mfg. Co.*, 39 Conn. 576 (criteria as to reasonable use of water by a mill).

Water Commrs. v. *Perry*, 69 Conn. 461, esp. 467.

Donnelly Brick Co. v. *New Britain*, 106 Conn. 167; 137 Atl. 745.

Gillett v. *Johnson*, 30 Conn. 180.

Parker v. *Hotchkiss*, 25 Conn. 321, 330.

It is undisputed, both in Connecticut and Massachusetts, that diversion of water of a stream for use upon riparian property within the same watershed is entirely proper if it constitutes as a matter of fact a reasonable use of the waters of the stream by the riparian owner.

Stratton v. *Mount Hermon Boys' School*, *supra*.

Hittinger Fruit Co. v. *Cambridge*, 218 Mass. 220 (percolating waters).

Isbell v. *Greylock Mills*, 231 Mass. 233 (where relief was denied).

Keeney & Wood Mfg. Co. v. *Union Mfg. Co.*, 39 Conn. 576, 582 (where diversion and mill use are compared).

Gillett v. *Johnson*, 30 Conn. 180, 183 (diversion of a small stream for purposes of irrigation).

Parker v. *Griswold*, 17 Conn. 288, 297 *et seq.*

See *Wier* v. *Covell*, 29 Conn. 197 (where the decision is based in part upon conveyances there involved).

As to a diversion outside the watershed, the Massachusetts cases are clearly to the effect that use of water outside the watershed is proper if in fact the use in the particular

case constitutes a reasonable use of the waters of the stream in such a way as to cause no material damage to the interests of lower riparian owners. Unless there is actual or perceptible damage to a lower riparian owner, not even nominal damages will be awarded upon his bringing an action of tort based upon the diversion.

Elliot v. *Fitchburg R.R.*, 10 Cush. 191.
Stratton v. *Mount Hermon Boys' School*, 216 Mass. 83, 85.

Upon the same principle, specific relief in equity will be denied to a complainant who cannot show that the diversion which he seeks to enjoin has caused actual damage to his right to make a reasonable use of a stream.

Isbell v. *Greylock Mills*, 231 Mass. 233, 236.

In most of the decided Connecticut cases the diversion complained of was in any event an unreasonable use of the water under the particular circumstances involved, so the question discussed in Massachusetts in the case of *Elliot* v. *Fitchburg R.R.*, 10 Cush. 191, has not been squarely ruled upon in Connecticut. The majority of the riparian cases in the two States deal with diversions from very small streams where any interference with the flow of the stream would be directly and immediately felt by lower riparian proprietors. None of the decided cases involved a situation of fact where the diversion, though taking many gallons of water, removed from the watershed only a very small percentage of the stream flow at the point where it reached the land of the complainant lower riparian owner. The courts deciding the riparian precedents in the two jurisdictions did not have before them a situation involving large riparian owners and diversions of considerable quantity in themselves but of small proportions to the nor-

mal stream flow. This fact, among others, makes the riparian precedents hardly applicable to the case at bar—where the two riparian owners involved are two *quasi*-sovereign States; where the flow of water in the interstate stream is on the average 17,000 cubic feet per second at the point where it reaches the complainant State (see Amended Answer, Appendix "C," p. 27; Reprint of Answer, p. 97); where the diversion takes place some fifty or more miles upstream on a small tributary and involves on the average between 100 and 300 cubic feet per second in wet seasons chiefly on one river (the Swift river, see Reprint of Answer, p. 97) plus the flood flows only of another stream (the Ware river, see Reprint of Answer, pp. 84-86). The vast difference in scale of the case at bar and of the average case hitherto decided between small riparian owners in the two States must be kept in mind, if the local riparian cases are to be in any sense of use by way of analogy.

The Connecticut rule as to diversions probably differs from the rule established in Massachusetts by the *Stratton* case in one particular. A lower riparian owner seems to be entitled to nominal damages even if the infringement of his riparian interests by a diversion to another watershed is of the most trivial sort possible. However, the courts of Connecticut apparently will not award substantial damages for such a diversion, nor will they enjoin such a diversion unless the complainant has suffered substantial damage because of the diversion. Apparently due weight is given to considerations of comparative damage and to facts constituting a basis for giving substitutional relief by way of damages rather than specific relief in the form of an injunction.

Watson v. *New Milford Water Co.*, 71 Conn. 442, 450.

Cf. Harding v. *Stamford Water Co.*, 41 Conn. 87, 95.

Balf Co. v. *Hartford Electric Light Co.*, 106 Conn. 315.

In the *Watson* case an injunction was denied upon the condition that compensation be paid to the complainants for the damage caused by the diversion.

In substance, we submit, the rule in Connecticut is fully as liberal with respect to reasonable but permanent diversions from the watershed as that laid down in the *Stratton* case for Massachusetts. That Connecticut permits the diversion of water from the watershed for use as a domestic water supply under state or municipal control is apparent from the cases cited. Due compensation for *actual damage* caused by the diversion must, of course, be paid.

See also *Beckerle* v. *Danbury*, 80 Conn. 124, 127.

It would seem that the Connecticut courts in a proper case would give due consideration to the amelioration of damage by compensation in kind by augmenting the flow of the diverted stream in dry seasons.

Harding v. *Stamford Water Co.*, 41 Conn. 87, 93.

The rule of reasonable user in the light of the circumstances in each particular case also extends to analogous matters, such as pollution. Each state permits a riparian owner to appropriate a reasonable amount of the capacity of a stream for dilution of sewage and waste.

Parker v. *American Woolen Co.*, 195 Mass. 591.

McNamara v. *Taft*, 196 Mass. 597.

Collins Mfg. Co. v. *Wickwire Co.*, 14 Fed. (2d) 871.
Merrifield v. *Lombard*, 13 Allen 16.
Harris v. *Mackintosh*, 133 Mass. 228.
Martin v. *Gleason*, 139 Mass. 183.
Nolan v. *New Britain*, 69 Conn. 668.
Platt Bros. & Co. v. *Waterbury*, 72 Conn. 531.
Lawton v. *Herrick*, 83 Conn. 417, 425.
Morgan v. *Danbury*, 67 Conn. 484.
See *Donnelly Brick Co.* v. *New Britain*, 106 Conn. 167, and cases cited.
See also *Rockport* v. *Elwell*, 219 Mass. 287.
Ingraham v. *Dunnell*, 5 Met. 118 (where apparently damages were held to be adequate).
Brookline v. *Mackintosh*, 133 Mass. 215.
Stamford Extract Mfg. Co. v. *Stamford Rolling Mills Co.*, 101 Conn. 310.
Rockville, etc., Co. v. *Koelsch*, 90 Conn. 171.
Cf. DeWitt v. *Bissell*, 77 Conn. 530.

So far as the local law of Connecticut and of Massachusetts is here of importance, we submit that it lays down a principle of reasonable user as between riparian owners—a principle of equality of right and opportunity limited only by the obligation not to inflict serious and substantial injury on others equally entitled. It further appears that both States lay some emphasis on the doctrine that specific relief can only be grounded on serious injury to the complainant by the diversion, and even if serious injury appears, serious consideration will be given by the courts to equitable considerations of expediency and comparative damage.

If this were a matter to be settled by an application of the most strict riparian rule (which, we contend, it is not), and regarding both States engaged in the present contro-

versy as riparian owners on a large scale, we submit that there are issues of fact adequately raised by the pleadings (particularly the allegations of the answer) as to the reasonableness of the Massachusetts project and as to the trivial nature of the alleged injury (if any) to Connecticut. The existence of these issues of fact would foreclose any present disposition of this case upon motions in the nature of demurrers to the answer. The allegations of reasonableness in the Massachusetts answer must, for the purpose of these motions, be taken to be true. Under the local law of both States, we submit that, if it be taken as true that the Massachusetts diversion will be in fact reasonable and that Connecticut will not be appreciably injured by it, not only would Connecticut be barred from specific relief by way of injunction but she would also be barred from more than nominal damages. It is obvious also, if the contemplated use of water by Massachusetts—

1. is in fact reasonable
2. in fact causes no appreciable damage to Connecticut—

that Massachusetts under the local law of water rights is taking no property of Connecticut or of its citizens. Thus even upon this factual hypothesis no question of the exercise of the right of eminent domain by one State over land in another State is here presented.

As we have argued above, however, this case must be decided on a broader basis than the municipal law of the two States concerned—a basis depending largely upon the facts actually found to be true. Until those facts are found, the pending motions should be denied.

2. Connecticut habitually permits diversions of streams for the purpose of supplying municipalities with water for domestic use. Connecticut in equity cannot complain if

Massachusetts makes reasonable use of interstate waters arising within her borders for similar purposes, even if a diversion be necessary; provided Massachusetts does not permanently abstract more than the share of such interstate waters to which she is entitled under the doctrine of equal division of benefit.

It is apparent from the decisions of this Honorable Court in interstate controversies (see *supra*, pp. 43-53) that the conduct of a complainant State in matters similar to those arising in the pending cause will be regarded as of some importance by the Court as establishing a standard by which to judge whether or not the conduct of the defendant State is equitable. In cases involving interstate waters the practice of the complainant State with respect to such waters or other similar waters affords some basis for determining whether or not the defendant State, in doing the acts complained of, is exceeding its fair share of the beneficial use of the interstate waters under the applicable doctrine of equitable division. The municipal practice in the States, parties to the controversy, influences the determination of the basis of making an equal division of benefit. In the case at bar, therefore, if it should appear that Connecticut habitually permitted diversion of streams for the purpose of water supplies, or that Connecticut recognized the priority of a claim to use water for domestic purposes over a claim to use water for power or for sanitation, it would warrant this Court in coming to the conclusion that the doctrine of equitable division should be applied so as to permit Massachusetts to make similar diversions for similar purposes, provided that the action of Massachusetts did not have any seriously detrimental effect upon the ability of Connecticut to make a like diversion for domestic purposes.

Connecticut for some years has by general statute permitted municipalities and public service water companies

to make diversions for water supply purposes. Section 2542 of the General Statutes of Connecticut (1918 revision) reads as follows:

> "*Power to take lands and streams.* Any town, city, borough or corporation authorized by law to supply the inhabitants of any town, city or borough with pure water for public or domestic use may take and use such lands, springs, streams or ponds, or such rights or interests therein, as the superior court, or any judge thereof in vacation, may, on application, deem necessary for the purposes of such supply. For the purpose of preserving the purity of such water and preventing any contamination thereof, such town, city, borough or corporation may take such lands or rights as the superior court, or any judge thereof in vacation, may, on application, deem necessary therefor. Compensation shall be made to all persons entitled thereto in the manner provided by section 2543."

Chapter 131 of the General Statutes contains comprehensive provisions for the safeguarding of water supplies, and shows the importance attached by Connecticut to a pure supply of suitable and fresh water for its cities and towns.

Section 5181 gives a broad permission to state departments to take water for use in state institutions:

> "*Condemnation of land and water for state institutions.* The state may take any land which the trustees or directors of any state institution may deem necessary for any addition to the site of such institution, and also may take water from any river, brook, spring or springs, pond or lake for the purpose of providing such supply of water as the convenience and necessity of such institution may require."

By special act many municipalities and public water companies in Connecticut are authorized to make particular diversions for municipal water supplies; in some cases the grant of power to make diversions being couched in general terms and apparently applying to all water flowing through or lying within Connecticut; in other cases, limited to the waters within stated geographical limits. An exhaustive list of the many special acts incorporating water companies or authorizing general or particular diversions would serve no useful purpose here. A few instances representative of a very large body of such legislation will suffice.

Ansonia Water Company, Incorporated, Conn. Act of July 9, 1884, Priv. Laws, Conn., vol. 5, p. 665, section 9, provides, in part:

> "The said company shall have full power . . . to construct . . . such reservoir or reservoirs as they may deem expedient or necessary; to take and use the water of any spring or springs, stream or streams, or other waters to such extent and in such manner as may be necessary or expedient . . . to the most perfect and complete supply of the borough of Ansonia with pure water for all public and private uses. . . ."

The charter was amended in 1909 (Spec. Laws, Conn., vol. 15, p. 971) to permit supplying the village of Ansonia "with an abundant supply of pure water for public, domestic, and general use."

Similar provisions are to be found in the Special Laws, as follows,—

Vol. 5, p. 244 (1859), Birmingham;
Vol. 11, p. 38 (1893), Bradford Water Company;
Vol. 4, p. 1356 (1856), Bridgeport Water Company;

Vol. 9, p. 910 (1884), Bristol Water Company—restricted by amendment to geographical limits, vol. 16, p. 240 (1911), but extended somewhat, Spec. Acts, Conn. (1919), c. 164;

Vol. 5, p. 673 (1864), Centreville Water Company;

Vol. 15, p. 584 (1907), Cornwall Water Company;

Vol. 5, p. 333 (1860), Danbury;

Vol. 12, p. 91 (1895), Farmington Water Company;

Vol. 14, p. 323 (1903), Glenville Power and Water Company—

for the development of reservoirs on the Byram river, an interstate stream. Amended Spec. Acts, Conn. (1927), c. 340, to permit supplying certain towns in Westchester County, State of New York, as well as Connecticut towns. A similar provision with respect to the Greenwich Water Company is found in Spec. Acts, Conn., 1925, c. 340.

Spec. Acts, Conn., 1925, c. 295, gave broad new powers to the New Haven Water Company with respect to a diversion of the waters of the Hammonassett river. Similarly, a considerable diversion by the Connecticut Light and Power Company for power purposes was authorized with respect to the Rocky river and the Housatonic river by Spec. Acts, Conn., 1919, c. 129.

A diversion was authorized from the Connecticut river itself to supply Hartford. Priv. Laws, Conn., vol. 4, pp. 1364, 1366 (1851). This supply has since been augmented by other diversions from interstate tributaries of the Connecticut river. Conn. Spec. Laws, vol. 16, part 1, pp. 389-395.

These statutory citations are sufficient, we submit, to show that in Connecticut there is a well-established policy

of permitting diversions for the purpose of water supplies. The decisions of the courts sustain this policy to the utmost, and, though compensation must be paid for any damage to property actually sustained by individuals, it is a question in each case of condemnation what that damage, if any, really is. If there were no substantial damage to a lower riparian owner, only nominal damages would be given.

The extent to which the Connecticut policy goes is shown by the case of *East Hartford Fire District* v. *Glastonbury Power Co.*, 92 Conn. 217. In that case the Connecticut court upheld a taking for municipal water supply purposes of water privileges held by the defendant company for future use for public utility purposes. In effect the Connecticut court announced that the Legislature had intended to establish a priority of privilege in favor of municipal water supplies, superior even to use of water for other public or *quasi*-public purposes. At pp. 222-223 the Court said:

> "As to the proposition that the development and maintenance of water-power is in itself a public use within the meaning of the rule relied on by the respondent, it should be noted that it has long been the custom of the General Assembly to grant to public and private corporations, chartered for the purposes of municipal water-supply, general authority to take water from any source within specified limits. In *Water Commissioners* v. *Johnson*, 86 Conn. 151, 164, 84 Atl. 727, the validity of these general grants was affirmed, with the remark that if they were not valid 'much, if not most, of our legislation empowering municipalities to provide water-supplies would fail.' It is also notorious that practically all of our streams available for municipal water-supply were long ago utilized for water-power, either directly or through

their connecting waters. It must therefore be supposed that the General Assembly, in making these general grants, intended them to be operative upon streams already used for water-power. Such has been the common understanding of their effect, and, it must be held, that, by necessary implication, these grants of general power to take water from any brook within specified territory authorize the taking of water from existing water-powers, at least when such water-powers are not already employed in some other public use at the time of the proposed taking."

Nor is the Connecticut policy supporting privileged use for municipal water supplies confined to any meagre construction of present necessities. The cities and towns of the State and the public service water companies that supply them are entitled to make due preparations for future necessities.

In *New Haven Water Co.* v. *Russell*, 86 Conn. 361, the power and obligation of a public service water company to anticipate future water requirements of a great city was stated by *Wheeler*, J., as follows:

"The trial court, against the objection of the respondents that the evidence was irrelevant and did not tend to prove the necessity, permitted the applicant to offer evidence that it had, since 1876, been preparing, by plans and purchases, to take the waters of these streams, and had recently constructed a tunnel, having a capacity of thirty million gallons a day, at an expense of over $300,000 for the purpose of diverting the waters of these streams into its system of water-supply.

"The evidence was admissible to put the judge in possession of all the facts connected with the proposed water-supply, and to show the good faith of the ap-

plicant. It was so held in a similar proceeding. . . . It was also admissible, as claimed, as tending to prove the necessity. No claim was made that the applicant had not expended these funds and made and executed these plans in carrying on its corporate business. That a private corporation has for over thirty years steadily pursued a definite plan looking to the ultimate acquisition of a source of water-supply, and to that end, through a period of years, has made land and mill-site purchases, and finally built, at great expense, a tunnel with a daily capacity in excess of the present daily consumption of the company, proves its own fixed belief that this source of water-supply is necessary; and we think such a course of conduct is a relevant fact in the proof of the issue of necessity. . . .

* * * * * * * *

"The respondents further insist that the court erred in overruling its claim that 'the time within which such reasonably definite amount of water is necessary, must be either present or within a reasonably short time in the future'; and they ask to have the finding corrected in certain particulars upon which the conclusion of necessity rests, and insist that the facts found by the judge do not legally support his conclusion of necessity.

* * * * * * * *

". . . A private corporation engaged in furnishing a water-supply to a community owes it the duty of providing an adequate supply of wholesome water at all times. Experience teaches that consumption increases largely in the summer season, and that changeable seasons, long droughts, and the liability of accidents are contingencies which must be guarded against; a supply adequate for the ordinary season or the present

need will not protect against such contingencies. . . . Growth in population and in industrial activity, with consequent increasing use of water, must be anticipated and provided for. . . . Provision for all such likely contingencies must not be scant; it must be ample, so that the health of the people be preserved and their property safeguarded from fire, and all their countless activities—so variously served by an abundant water-supply—be sustained and developed. The supply should be so ample as not only to avoid anxiety lest it fail, but so ample that a scarcity could not be reasonably apprehended. The property taken must be restricted to that which will reasonably serve the public use; more than that would, in effect, be a taking for private use, and illegal because an abuse of power. . . . Nor may private property be taken for speculative purposes, or to secure a monopoly, or forestall a rival; . . . or in bad faith, or indeed for any other than the corporate purpose. . . . Purposes such as these are clearly not among those reasonably necessary.

"It cannot be foretold when the contingencies of which we have spoken may be expected, nor can the future requirements and prospective needs within a reasonable time be estimated with exactitude; it is necessarily a matter of judgment based upon knowledge of the present and experience of the past. The reasonableness of the necessity must be ascertained from the facts of each case; and a reasonable discretion in reaching this conclusion will not be interfered with. . . . The reasonableness of the necessity will be determined with due regard to the principle that a public or private corporation, charged with the duty of supplying a community with water, fails in its duty if it provides for the present needs and takes no heed of future needs or imminent contingencies. The remedy

should precede the untoward happening, and for its accomplishment, prospective needs, within a reasonable time, should be considered."

This language is quoted at length because it embodies a principle which indicates one of the fundamental equities of the case at bar. Connecticut recognizes that water supply projects are expensive and, when undertaken, sound economy dictates that they shall be so planned that not only the immediate needs of a community, but also the needs of a generation hence shall be satisfied by the same project, without further duplication of expense in the future. Sovereigns and their agencies are not to be required to pursue a hand-to-mouth policy. They are to be permitted to anticipate the future so far as the future is predicable, and so far as the needs of future years are uncertain, a State is entitled to make a reasonable guess based upon the criteria and data at hand.

The existence of this doctrine and of its practical application in Connecticut is one of the elements which this Court may properly consider in determining the law applicable to the case at bar. Upon the pleadings, the Massachusetts allegations that Connecticut will be caused no substantial damage by the Metropolitan District Water Supply project must be taken as true. Upon such an actual state of fact, if found by the trier of the fact in an *intra*-state condemnation suit, the lower riparian owner would be entitled to no damages, or at most to purely nominal damages. Under the most strict and rigid construction of the common law of riparian rights a lower riparian owner would in such circumstances have no basis of action against an upper riparian owner causing no damage by a diversion. Certainly he could obtain no specific relief in equity. Even if some slight damage were caused to Connecticut by the proposed diversions (which, under the present state of the pleadings in this case, does not appear), the practice of

Connecticut with respect to municipal water supplies would lead this Court in applying the doctrine of equitable division of the benefit of interstate waters to consider whether equity did not require that Connecticut be remitted to substitutional relief by way of damages at law and individual inhabitants to relief based upon the terms of the Massachusetts statutes (see original Answer, Appendix "A," pp. 38-40, 52-54, 59; Mass. St. 1926, c. 375, § 1; Mass. St. 1927, c. 321, §§ 4, 7). See *Manville Co.* v. *Worcester*, 138 Mass. 89; *Brickett* v. *Haverhill Aqueduct Co.*, 142 Mass. 394, 396; *Andrus* v. *Berkshire Power Co.*, 145 Fed. 47; 147 Fed. 76; cert. den. 203 U.S. 596. See also an interesting opinion in which the Attorney General of Massachusetts declined to take action against Connecticut at the request of Massachusetts landowners injured to some extent by the flowage of their land by a power project carried out in Massachusetts. In vigorous language the then Attorney General states that it is not his duty to represent the Commonwealth in interstate controversies except where in some way the general welfare of the community has been seriously affected by the action of another sovereign. The existence of a right to sue for compensation in Connecticut even for damage to Massachusetts land was regarded as affording a reasonable remedy to citizens of Massachusetts affected by the act of the Connecticut company. See Memorandum, Mass. Op. Atty. Gen., vol. III (1908), p. 596. The existence of a remedy at law for individual inhabitants of Connecticut or persons owning lands in Connecticut is an element which this Court should consider (if it should eventually appear that Connecticut is damaged) under the doctrine of equitable division, particularly in view of the fact that the statutes of Connecticut have established a policy of forced taking of waters for municipal water supplies. The situation, in the event that the Special Master appointed in this cause found that lands in Connecticut were to some degree damaged, would then,

as part of the doctrine of equitable division, call for the application of the equitable principle of comparative damage, laid down in *Kansas* v. *Colorado*, 206 U.S. 46, 100, 113-114 (see *supra*, pp. 45-48). Conceivably denial of equitable relief could be made conditional upon continued furnishing of the compensatory flow ordered by the War Department (see Appendices "B" and "C," Amended Answer, pp. 12-32; Reprint of Answer, pp. 81-102, esp. 99-100). Upon the technical admissions of the pending Connecticut motions, it must be taken as a fact that the Massachusetts diversion is to be reasonable and that no substantial damage to Connecticut will take place (see Original Answer, par. 16, esp. p. 15; par. 17, esp. p. 20; Reprint of Answer, pp. 17-18, 23). The question of compensation, therefore, does not arise upon these motions.

III.

UPON THE ISSUES RAISED BY THE ANSWER, MASSACHUSETTS ALLEGES FACTS WHICH, IF PROVED, CONSTITUTE A FULL AND ADEQUATE DEFENSE TO THE BILL OF COMPLAINT. THE MOTIONS TO DISMISS AND TO STRIKE OUT THE ANSWER SHOULD BE DENIED AND THE CASE SHOULD BE COMMITTED TO THE SPECIAL MASTER.

A. Under the Law Applied by this Honorable Court in Litigation as between States of the Union, Connecticut will Not be Entitled to Relief in Equity unless she Shows Great, Unusual, and Substantial Damage to her Sovereign Rights. Equitable Principles of Comparative Damage are Applicable to this Case.

It is well settled that this Court, in exercising its original jurisdiction between States, requires that the complainant State prove that the injury which is the basis of its proceeding is a real and substantial injury causing serious damage to the complainant. It is generally stated that in

order to obtain equitable relief in a suit between two States of the Union far greater damage to the interests of the complainant State must be shown than must be proved by the complainant in the case of a controversy between two private individuals.

Missouri v. *Illinois*, 200 U.S. 496, 521.
New York v. *New Jersey*, 256 U.S. 296, 309.
North Dakota v. *Minnesota*, 263 U.S. 365, 374.

The doctrine of the cases just cited is supplemented by the doctrine that a State will not be entitled to relief in a case brought under the original jurisdiction of this Court unless it can show that a present and substantial interest is affected by the injury complained of.

New York v. *Illinois*, 274 U.S. 488, esp. at p. 490.
New Jersey v. *Sargent*, 269 U.S. 328.
Cf. Pennsylvania v. *West Virginia*, 262 U.S. 553, 593.

It is also true that this Court will not grant equitable relief to one State against another where the complainant State is suing purely on behalf of its individual inhabitants. The interest sought to be protected by the complainant State must, of course, be an interest so general in its scope that its protection is a duty of the complainant State as *parens patriae*.

See *North Dakota* v. *Minnesota*, 263 U.S. 365, at p. 375 *et seq.*

In a case very similar to the cases which ordinarily come to this Court in the exercise of its original jurisdiction between States, this Court gave great weight to facts which gave a basis for equitable defenses—in the particular case

that of laches—as a reason for granting substitutional rather than specific relief.

New York City v. *Pine*, 185 U.S. 93.

The cases of interstate water controversies examined at length *supra* (pp. 43-54) show that this Court gives attention to a comparison of the damage to a complainant State which would be caused by denying an injunction and that which would be caused to a defendant State by allowing an injunction.

See, especially, *Kansas* v. *Colorado*, 206 U.S. 46, 100 *et seq.* (see *supra*, pp. 45-48).

We contend that allegations of fact in the answer which set up a basis for the denial of specific relief upon equitable principles are fully as pertinent as those allegations which categorically deny Connecticut's right to any relief.

B. As a Matter of Law the Facts Alleged in the Answer, if Taken to be True, Constitute a Full Defense to the Bill, and Specific Equitable Relief should be Denied.

In the statement of facts (*supra*, pp. 1-4) we have outlined—

(1) the facts affirmatively alleged in the bill and admitted by the answer.

(2) the facts affirmatively pleaded in the answer, the truth of which is admitted for the purposes of the pending motions by Connecticut.

We contend that the facts thus set up are sufficient in law to be a complete answer to the allegations of the bill or to raise issues of fact which according to the custom of this Court should be decided by the Special Master. The two motions must be examined in detail.

The Motion to Dismiss.

1. Paragraph 1 (Mot. to Dismiss, p. 5) raises the question of the general inadequacy of the answer. We submit that the denials and allegations of the answer show sufficient facts—

(*a*) to raise issues of fact as to the existence of any damage to Connecticut.

(*b*) to furnish a basis for the denial of specific relief in equity.

(*c*) to show that Massachusetts does not propose to divert more than her equitable share of waters arising within her borders and forming a part of the Connecticut river watershed.

2. Paragraph 2 of the motion is obviously rendered unimportant by the amendments of the answer (allowed December 2, 1929) setting up the action of the War Department.

3, 4, 5, 6, 7, 8, and 9. These paragraphs (Mot. to Dismiss, pp. 6-8) deal with the Federal issue of navigation. The answer makes allegations of fact—

(*a*) that the diversions proposed will not diminish appreciably (or in such a way as to be capable of measurement at the state line—see, *e.g.*, Answer, par. 17, p. 19; Reprint of Answer, p. 22) the amount of water flowing in the Connecticut river in its navigable portion.

(*b*) that no structures are to be erected in navigable waters.

(*c*) that the Secretary of War has found as a fact that, if the diversion is kept within the limits specified, it will have no adverse effect on navigation.

These facts (taken to be true for the purpose of these motions), under the principles of law fully discussed (*supra*, pp. 14-35), are adequate as a defense to the bill so far as the issue of navigability is concerned.

10, 11, 12, and 13. These paragraphs of the motion to dismiss (pp. 8-9) rest upon the contentions—

(*a*) that the Massachusetts project involves substantial damage to Connecticut—which Massachusetts denies emphatically.

(*b*) that the Massachusetts project involves a permanent appropriation of more water than Massachusetts is entitled to under the principle of equitable division as between sovereign States of the beneficial use to be derived from the waters of interstate streams.

(*c*) that the Massachusetts project involves an unreasonable use of water.

Connecticut upon these motions must be taken to have admitted the truth of the allegations of fact in the answer as to the comparative unimportance of the Massachusetts diversion as measured by its effect upon the flow of the Connecticut river at the boundary of the two contestant States. Upon this admission of fact, we submit that as a matter of law—

(*a*) it cannot be said that there is any taking of property in Connecticut by Massachusetts requiring the exercise of eminent domain.

(*b*) it cannot be said that Connecticut has shown sufficient damage to entitle her to relief in equity as of absolute right before this Honorable Court.

(*c*) it cannot be said that the Massachusetts project is unreasonable under either the principle of equitable division of benefit or the most strict riparian doctrine.

14 and 15. These paragraphs proceed upon the theory that the rule of law applicable to the case at bar is the most strict common-law doctrine of riparian rights to be found in the books. We submit that the municipal law of the two States has been radically liberalized by decision, statute, and commercial and municipal practice (see *supra*, pp. 68-79). We contend further that municipal law of the

two States is not here applicable, but rather that the *quasi*-international principle of equitable division as between sovereign States is controlling. Under any view of the law of the case, the allegations of fact in the answer showing that the Massachusetts project is a *de minimis* matter are a sufficient basis for denying Connecticut relief upon these motions.

16. Connecticut in paragraph 16 (Mot. to Dismiss, pp. 10-11) denies the pertinency and adequacy of all allegations of Massachusetts which form a basis for the denial of specific relief for equitable reasons. That this Court will give consideration to all the equities of the situation before it in an interstate controversy is settled beyond a doubt (see *supra*, pp. 79-81).

The Motion to Strike Out.

1. This paragraph (Mot. to Strike Out, pp. 5-6) seeks to strike out allegations of the answer denying damage to Connecticut. Obviously, upon the principle of equitable division (and even upon the most rigid common law principles of riparian law), the existence of substantial damage is a condition precedent to relief.

2. This paragraph (Mot. to Strike Out, pp. 6-8) seeks to eliminate from the answer all allegations of possible benefit to Connecticut from the partial diversion of the flood waters of the Swift river and the Ware river and from the release of stored flood waters in seasons of drought. These allegations of the answer are material—

(*a*) as a possible basis of the War Department findings in the interest of navigation (see *supra*, p. 32).

(*b*) as a basis for the application of equitable principles of comparative damage and conditional denial of relief.

(*c*) as showing that Connecticut is not damaged and is, therefore, entitled to no relief.

3. This paragraph of the motion to strike out (pp. 8-12) seeks to have removed all allegations in the answer as to the necessities of the Massachusetts action. These allegations are material as—

(*a*) furnishing ground for the application of equitable principles of comparative damage.

(*b*) providing a basis for a recognition of the *quasi*-international doctrine of the priority of claim of municipal water supplies upon the waters of international and interstate streams, as an integral part of the recognized doctrine of equitable division.

(*c*) showing the purpose of the Massachusetts diversion, so that it may be judged in the light of similar diversions made by Connecticut.

These allegations of the answer must be viewed in connection with the allegations showing that the proposed diversion is in fact *de minimis* and setting up the reasonableness and equitable nature of the Massachusetts project.

4. Paragraph 4 (pp. 12-14) of the motion seeks to strike out all references in the answer to the defense based on the alleged laches of Connecticut. Upon these motions Massachusetts does not contend that Connecticut's delay in acting is sufficient to bar that State from all relief before this Court. We do contend that Connecticut's conduct in fact does furnish some basis for the denial of specific relief—and we submit that the allegations should be permitted to remain a part of the answer, until after a report from the Special Master is received by this Honorable Court.

5. This paragraph (Mot. to Strike Out, p. 14) seeks to strike out all allegations with respect to the expense incurred by Massachusetts. Under the law of Connecticut the expense of such a project as this may be relied upon as showing good faith (*supra*, p. 74). It certainly is an element which might well influence this Court in applying

equitable principles of comparative damage and conditional denial of specific relief.

6. Connecticut by paragraph 6 (Mot. to Strike Out, pp. 14-17) asserts that the allegations in the answer of the existence of an adequate remedy at law are immaterial. The facts set up in the portions of the answer sought here to be eliminated certainly are appropriate for consideration of this Court in the determination of the issue of whether or not specific relief by way of injunction should be granted to Connecticut. The facts (admitted by these motions) that the Massachusetts diversion is *de minimis* and that no substantial damage is caused to Connecticut or to any property in Connecticut make these allegations of the answer exceedingly pertinent.

7, 9, and 11. These paragraphs (pp. 17-20, 24-26, 29-30) of the motion seek to strike out all allegations of the answer denying injury to the health, welfare, safety, and other interests of the citizens of Connecticut, all allegations setting up the *de minimis* nature of the diversion, and all allegations affirming the reasonableness of the Massachusetts project. These allegations raise the essential issues of the case:

(*a*) If Connecticut is not damaged, she is not entitled to relief.

(*b*) If the fundamental welfare of the Connecticut community is not seriously harmed, Connecticut can have no relief as against a sister *quasi*-sovereign State.

(*c*) If the Massachusetts project leaves the Connecticut river to all intents and purposes the same river as to volume of flow and quality of water when it enters Connecticut, Connecticut certainly has no claim for relief under either the principle of equitable division of benefit or under any principle of the municipal law of riparian rights. These allegations of the answer are entirely essential, material, and proper.

8. Paragraph 8 (Mot. to Strike Out, pp. 20-24) seeks to strike out certain allegations of the answer dealing with the question of navigability. Some of the contents of this paragraph of the motion are rendered obsolete by the amendments to the answer (allowed December 2, 1929). The others are effectually answered by the arguments upon the motion to dismiss (*supra*, p. 84).

10. This paragraph (pp. 27-28) of the motion seeks to strike out one portion of the Massachusetts answer, setting up the general nature of the project and three portions of the answer alleging that by the municipal law and actual commercial and municipal practice of the two States here involved reasonable diversions of water causing no substantial damage to other riparian owners are proper, particularly when made for water supply purposes. It is obvious that the general statement of the project (Answer, par. 14, pp. 12-13; Reprint of Answer, p. 15) is pertinent and proper as showing the precise nature of the acts complained of by Connecticut. The allegations as to the law of Connecticut and Massachusetts and the practice with respect to the use of waters in those States are pertinent in view of the fact that this Court gives some weight to these matters in determining the principles upon which it will make an equitable division of interstate waters (see *supra*, pp. 43-54).

12. Paragraph 12 (Mot. to Strike Out, p. 30) seeks to eliminate a denial by Massachusetts of Connecticut's claim to an absolutely undiminished flow in the Connecticut river. The Connecticut contention to this effect blandly overlooks the principle of equitable division so frequently announced by this Court and ignores the fact admitted by the motion that the Massachusetts diversion is negligible and thus involves no taking of property in Connecticut under any theory of law.

C. As a Matter of Discretion, this Honorable Court should Deny the Motions of Connecticut and should Commit this Case to the Special Master for Findings of Fact.

We have argued above (*supra*, pp. 81-87) that the facts alleged or admitted in the defendant's answer are sufficient as a matter of law to constitute a defense to the Connecticut bill. We submit that we have shown (*supra*, pp. 35-54) how much this Court has been accustomed to rest its determination of the principles of law applicable to an interstate water dispute upon the facts revealed by the particular case. The facts not only are the basis for the application of established legal principles by this Court, but to some extent the facts determine the legal principles to be applied and enter into the creation of new rules of law developed for the determination of the pending case alone. It is apparent, therefore, that the definite ascertainment of the facts pertinent to the pending controversy is a necessary condition precedent to the determination of the principles of law by which the case is to be decided. Obviously, motions are premature which seek to have allegations of fact in the answer (necessarily general because of the magnitude of the project involved) stricken out and dismissed as inadequate to constitute a defense in law or in equity, when those facts are established as admitted solely in a very technical sense for the purposes of the motions.

It is, of course, necessary that the allegations of the answer as to the reasonableness of the contemplated diversions be couched in general terms. Before these allegations really can mean anything to this Court, sitting as a *quasi*-international tribunal, they must be expanded, explained, analyzed, and tested by some competent trier of the fact who can examine the whole project in the light of the background of local custom and economic practice and as affected by local law and public necessity. Attached hereto (opposite this page) are four photographs to serve as a

A. WARE RIVER BELOW POINT OF DIVERSION.

B. SWIFT RIVER 1 MILE BELOW POINT OF DIVERSION.

Note: Of course no diversion has in fact taken place as yet. The project will not take effect at all until 1931 (Answer, par. 19, p. 23; Reprint of Answer, p. 26).

C. The Connecticut river from slightly below the Massachusetts–Connecticut State line.

D. The Connecticut river looking upstream from the Massachusetts–Connecticut State line.

graphic illustration of our argument that as a matter of policy this Court should have all the facts before it before determining any questions of law going to the root of the whole controversy. The two pictures marked "A" and "B" on page A show the Ware river and the Swift river, respectively, at or near the point of diversion. The two pictures marked "C" and "D" on page B show the Connecticut river at or near the point where the river crosses the boundary between Connecticut and Massachusetts. An examination of these pictures immediately brings to mind a large number of questions of fact that this Court would insist on having answered before determining this important cause. How much of the flow shown in the Ware and in the Swift rivers will be taken under the Massachusetts plans? Is this a fairly representative wet or dry season flow? What is the usage of the community through which these streams flow as to diversions? storage? regulation of flow? disposal of liquid industrial waste? What proportion of the flow shown in the Connecticut river comes from the flow shown in the Ware and Swift rivers? What relation does experience show exists between the flow of the Connecticut river, both at Hartford and at the state boundary, and the flow of the Swift river and the Ware river? How does the change of tide and wind affect that relation? Would any diversion in fact be permitted under the terms of the War Department findings when a condition of stream flow existed as shown in these pictures? All these questions and many more must be answered before the issue of the reasonableness of the Massachusetts project can properly be determined. We do not offer these photographs as having any evidential value. They are submitted purely as a chalk to emphasize our argument that this case involves primarily questions of fact. After those questions have been decided, issues of law will arise. Before those questions are decided, any attempt to dispose of issues of law or of issues of mixed fact and law is premature.

We submit that in the exercise of a sound judicial discretion the Connecticut motions should be denied and the cause committed to the Special Master.

Respectfully submitted,
THE COMMONWEALTH OF
MASSACHUSETTS,
By JOSEPH E. WARNER,
Attorney General,
BENTLEY W. WARREN,
Special Assistant Attorney General,
GERALD J. CALLAHAN,
Assistant Attorney General,
R. AMMI CUTTER,
Assistant Attorney General.

Of Counsel:
MANLEY O. HUDSON.

APPENDIX "A"

A Memorandum Discussing Precedents as to the Use of International or Interstate Streams or Lakes.

This memorandum is designed to supplement the discussion of international law precedents applicable to the case at bar to be found in the body of the brief (see *supra*, pp. 54-61).

The Summary Prepared by the Institute of International Law.

The subject of the international regulation of international waters with respect to their exploitation for water power and their exploitation in general was elaborately studied by the Institute of International Law in 1911. The Sixth Commission of the Institute, with Professor von Bar as *rapporteur*, including as members of the Commission Messrs. Engelhardt, Harburger, Kaufmann, Meurer, Oppenheim, Politis, Rolin, and Vesnitch, made an elaborate report on the subject, based upon an article by Professor von Bar published in the *Revue de Droit International Public*, 1910, p. 281. The report of the Commission is to be found in the *Annuaire* of the Institute for 1911, pp. 156-199. The subject was carefully considered by the Institute at its Madrid session, April 19-20, 1911 (see *Annuaire* for 1911, pp. 347-364). At the conclusion of this consideration, the Institute voted the following resolutions (*Annuaire* for 1911, pp. 365-367, translation from the French as published in *Scott, Resolutions of the Institute*, 1916, pp. 169-170):

> "I. When a stream forms the frontier of two States, neither of these States may, without the consent of the other, and without special and valid legal title, make or allow individuals, corporations, etc., to make alterations therein detrimental to the bank of

the other State. On the other hand, neither State may, on its own territory, utilize or allow the utilization of the water in such a way as seriously to interfere with its utilization by the other State or by individuals, corporations, etc., thereof.

"The foregoing provisions are likewise applicable to a lake lying between the territories of more than two States.

"II. When a stream traverses successively the territories of two or more States:

"1. The point where this stream crosses the frontiers of two States, whether naturally, or since time immemorial, may not be changed by establishments of one of the States without the consent of the other.

"2. All alterations injurious to the water, the emptying therein of injurious matter (from factories, etc.), are forbidden.

"3. No establishment (especially factories utilizing hydraulic power) may take so much water that the constitution, otherwise called the utilizable or essential character of the stream, shall, when it reaches the territory downstream, be seriously modified (*gravement modifié*).

"4. The right of navigation by virtue of a title recognized in international law may not be violated in any way whatever.

"5. A state situated downstream may not erect or allow to be erected within its territory constructions or establishments which would subject the other State to the danger of inundation.

"6. The foregoing rules are applicable likewise to cases where streams flow from a lake situated in one State, through the territory of another State, or the territories of other States.

"7. It is recommended that the interested States appoint permanent joint commissions, which shall

render decisions, or at least shall give their opinion, when from the building of new establishments serious consequences might result in that part of the stream situated in the territory of the other State."

These resolutions of the Institute seemingly embody the principle of equitable division of the benefits of waters, as between sovereign States, which this Court has consistently applied in interstate controversies. The principles here suggested establish no hard and fast rule that diversions are entirely prohibited. On the contrary, standards are set up according to which diversions and other modifications of stream flow may properly take place, and the underlying principle of those standards is that an upper State may use and permanently abstract a reasonable amount of the stream, provided that the change in the stream does not seriously alter the ability of any lower State to make a similar permanent abstraction.

Treaty Recognition of Equitable Division Principle.

The new régime laid down for international rivers in the Treaty of Versailles of June 28, 1919, is designed to protect navigation on the rivers first of all, and article 336 of the Treaty of Versailles recognizes navigation as of paramount interest. But in article 358 of the Treaty of Versailles, France is given, subject to the obligation to comply with the provisions of the Convention of Mannheim or of the Convention which may be substituted therefor, and to the stipulations of the present treaty, on the whole course of the Rhine between the two extreme points of the French frontiers, "the right to take water from the Rhine to feed navigation and irrigation canals (constructed or to be constructed) or for any other purposes, and to execute on the German bank all works necessary for the exercise of this right." She is also given an exclusive right

to power derived from works of regulation on the river. It is provided, however, that the exercise of these rights shall not interfere with navigability nor reduce the facilities for navigation. It is also recognized that the same rights may be enjoyed by Switzerland. By article 351 of the Treaty of Versailles, Czechoslovakia, Yugoslavia, and Roumania are permitted, with the authorization of the International Commission, to undertake works on any part of the river system which forms a frontier. Article 336 provides means of preventing interference with navigation as a consequence of works which may be erected by any State. But in article 337 a clear recognition is to be found of the various purposes for which works on a river may be erected, and the tribunal instituted by the League of Nations for dealing with questions arising out of the erection of works is directed to give priority even over navigation to certain uses which may be made of the water. Thus article 337 provides:

> "The tribunal mentioned in the preceding Article shall be entitled to enforce the suspension or suppression of such works, making due allowance in its decisions for all rights in connection with irrigation, water-power, fisheries, and other national interests, which, with the consent of all the riparian States or of all the States represented on the International Commission, if there is one, shall be given priority over the requirements of navigation.
>
> "Appeal to the tribunal of the League of Nations does not require the suspension of the works."

European Treaties Concerning Use of Streams.

Analogous provisions are to be found in article 298 of the Treaty of St. Germain with Austria. Moreover, special provisions were introduced in the Treaty of St. Germain (articles 309-310) relating to the use of water in

international streams for hydraulic power and for municipal or domestic purposes.

In article 282 of the Treaty of Trianon with Hungary, and article 292, the high contracting parties deal very elaborately with the use of the hydraulic system for canalization, inundation, irrigation, drainage, or similar matters, and by article 293 a special Permanent Technical Hydraulic System Commission is created to study not only questions relating to navigation, but also special questions relating to fishery interests and other hydraulic matters. Analogous provisions are to be found also, in article 226 of the Treaty of Neuilly with Bulgaria, article 234 of which relates to the maintenance and improvement of works on the Danube River for other purposes than navigation.

The Statute on the Régime of Navigable Waters of International Concern annexed to the Convention opened for signature at Barcelona, April 20, 1921 (7 LEAGUE OF NATIONS TREATY SERIES, p. 35), provides (article 10) that each riparian State is bound to refrain from measures that would prejudice navigability, but paragraph 3 of article 10 recognizes other interests of the State which may, in some cases, take precedence even over navigability. These are enumerated as follows: "*inter alia*, the maintenance of normal water conditions requisite for irrigation, the use of water power, or the necessity for constructing other or more advantageous ways of communication." It is also recognized in paragraph 6 of article 10 that a State may have "an economic interest clearly greater than that of navigation."

On December 9, 1923, a convention on the Development of Hydraulic Power Affecting more than One State was opened for signature at Geneva (119 BRITISH AND FOREIGN STATE PAPERS, p. 541). Article 4 of this Convention provides that, "if a contracting state desires to carry out operations for the development of hydraulic power which might cause serious prejudice to any other contracting

state, the states concerned shall enter into negotiations with a view to the conclusion of agreements which will allow such operations to be effected." And by article 6 such agreements are to deal *inter alia* with the regulation of the flow of water.

A Convention instituting a Definitive Statute of the Danube was signed in Paris, July 23, 1921 (BRITISH TREATY SERIES, No. 16, 1922). Under article 14, a riparian State must inform the International Commission of works which it plans to have undertaken in connection with irrigation or the utilization of hydraulic power, but the Commission may not prohibit such construction except in so far as it is detrimental to navigation.

The Statute of Navigation of the Elbe was instituted by a convention signed at Dresden February 22, 1922 (26 LEAGUE OF NATIONS TREATY SERIES, p. 219). By article 39 of this statute a riparian State must furnish the International Commission of the Elbe a description of works which it proposes, including defense works against inundation and "works affecting irrigation and the use of hydraulic energy." The Commission is given power to prohibit works only in so far as they entail construction prejudicial to navigation, and in this connection it must take into consideration "all the interests of the riparian state." Under article 43 a State may have an obligation to cooperate in improvements planned by another State, though it is recognized that this obligation may not exist where its interests such as "the maintenance of the normal regulation of the water, the needs of irrigation, the use of hydraulic energy" are opposed.

Attitude of United States in Controversy with Mexico.

In 1880 the United States protested to Mexico against the diversion of water of the Rio Grande for irrigation (1 *Moore, Digest of International Law*, p. 653). In 1895

Mexico protested to the United States against a similar use made by the United States, but the United States replied that "the rules of international law imposed upon the United States no duty to deny to its inhabitants the use of the water of that part of the Rio Grande lying wholly within the United States although such use resulted in reducing the volume of water in the river below the point where it ceased to be entirely within the United States" (1 *Moore, Digest of International Law*, p. 654). Again, in 1896, Mexico protested to the United States about the use of water in the United States for irrigation. This later led to the decision in *United States* v. *Rio Grande Co.*, 174 U.S. 690. On May 21, 1906, a convention was concluded between the United States and Mexico providing for the equitable distribution of the water of the Rio Grande for irrigation purposes (1 U.S. TREATIES AND CONVENTIONS, p. 1204). By this convention the United States agreed to deliver to Mexico a certain volume of water annually, but article 5 of the convention distinctly states that the United States does not concede any legal basis for claims asserted or to be asserted by owners of land in Mexico, "nor does the United States in any way concede the establishment of any general principle or precedent by the concluding of this treaty." In 1913 negotiations were conducted looking toward an agreement between the United States and Mexico concerning a division of the waters of the Colorado river, but were abandoned on account of political conditions (*U.S. Foreign Relations*, 1913, p. 977 *et seq.*).

Various States have made treaties concerning the common use of waters. An interesting example of such a treaty is that between Norway and Sweden of August 26, 1905 (*Descamps et Renault, Recueil International*, p. 367). A somewhat similar treaty was made between Norway and Finland, February 14, 1925 (49 LEAGUE OF NATIONS TREATY SERIES, 381). An important treaty concerning the

use of waters of the Meuse was concluded by Belgium and Holland, May 12, 1863.

By an exchange of notes of June 12 and June 15, 1925, the British and Italian Governments effected an agreement concerning the utilization of the water of the river Gash in Eritrea and in the province of Kassala (121 BRITISH AND FOREIGN STATE PAPERS, p. 798). These waters are to be used for irrigation purposes, and the discharge of the river up to certain amounts is made available to each of the two Governments for such purposes.

Interstate Compacts.

Recent developments in the United States with reference to interstate compacts have also tended toward establishing bases for an equitable division and apportionment of international and interstate waters. The outstanding example is the Colorado River Compact, signed at Santa Fé, New Mexico, November 24, 1922. The compact was authorized by Act of Congress approved August 19, 1921, 42 STAT. AT L., pp. 171-172, the purpose of which the preamble stated, in part, as follows (at p. 172):

> "Whereas the territory included within the drainage area of the said stream and its tributaries is largely arid and in small part irrigated, and the present and future development necessities and general welfare of each of said States and of the United States require the further use of the waters of said streams for irrigation and other beneficial purposes, and that future litigation and conflict respecting the use and distribution of said waters should be avoided and settled by compact between said States;"

The compact was in the enacting clause said to provide "for an equitable division and apportionment among said States of the water supply of the Colorado River and of

the streams tributary thereto." By the Act of December 21, 1928, c. 42, esp. §8, 45 STAT. AT L., 1062, the "equitable division of the benefits, including power, arising from the use of water accruing to said States" is to be made according to the terms of the Compact and of other contemplated interstate compacts, in such a way as to bind not only the participating States, but the United States.

Article 4 of the Compact itself provides that, inasmuch as the Colorado River has ceased to be navigable, "the use of its waters for purposes of navigation shall be subservient to the use of such waters for domestic, agricultural and power purposes." It is also provided that the waters may be impounded and used for the generation of electrical power, but "such impounding and use shall be subservient to the use and consumption of such water for agricultural and domestic purposes and shall not interfere with or prevent use for such dominant purposes." The term "domestic use" is defined in article 2 of the Compact to include "the use of waters for household, stock, municipal, mining, milling, industrial, and other like purposes, but shall exclude the generation of electrical power." Here again the priority and dominance of domestic use of water is recognized.

APPENDIX "B."

BRIEF STATISTICAL SUMMARY OF THE CASE.

The Swift river and the Ware river, both of which are wholly in Massachusetts, are non-navigable tributaries of the Chicopee river, a non-navigable tributary of the Connecticut river (Reprint of Answer, pp. 81, 96).

Total watershed of Connecticut river (Bill, p. 4),	11,300 sq. miles
Watershed of Connecticut river lying above Massachusetts-Connecticut boundary (Reprint of Answer, p. 97),	9,915 sq. miles
Drainage area of Connecticut river watershed in Connecticut (by subtracting 9,915 from 11,300),	1,385 sq. miles
Total drainage area of Ware river (Bill, p. 5),	221 sq. miles
Drainage area of Ware river at point of partial diversion (Reprint of Answer, p. 11),	98 sq. miles
Total drainage area of Swift river (Bill, p. 5),	213 sq. miles
Drainage area of Swift river at point of partial diversion (Reprint of Answer, p. 21; Plan opposite Reprint, p. 36; Reprint of Answer, p. 85),	186 sq. miles
Drainage area of Swift river at Bondsville (Reprint of Answer, p. 93),	195 sq. miles
Population of Metropolitan Area about Boston (Reprint of Answer, pp. 20-21),	1,900,000
Population of Connecticut in 1920 (U.S. Bureau of the Census, 14th census, 1920, vol. 1, p. 20),	1,380,631

Population of Connecticut in 1928 (U.S. Bureau of Foreign and Domestic Commerce. Statistical abstract of the United States, 1929, p. 7; annual midyear estimates by States). 1,667,000

DIVERSIONS PROPOSED.

Ware River.

Massachusetts Legislation.

Flood flow in excess of 85,000,000 gallons per day between November 30 and June 1 of each year. No water to be diverted between May 31 and December 1 in any year without approval of State Department of Health (Mass. St. 1926, c. 375, §§ 1, 4; Reprint of Answer, pp. 37, 40; 84-85).

War Department Decision.

Diversion of flood waters in excess of 85,000,000 gallons per day for the period from October 15 to June 15 of each year (Reprint of Answer, pp. 81-87, esp. pp. 86-87).

Swift River.

Massachusetts Legislation.

Diversion authorized of all waters except those required to maintain a flow at Bondsville (about five miles below proposed Swift river reservoir; Reprint of Answer, p. 93) of 20,000,000 gallons per day. The Massachusetts legislation requires a guaranteed flow of 20,000,000 gallons at Bondsville (Mass. St. 1927, c. 321, §1; Reprint of Answer, p. 52).

War Department Decision.

Diversion of all waters except those required to maintain a flow at Bondsville of 20,000,000 gallons per day

except that during the period from June 1 to November 30 (both inclusive) 110 cubic feet per second shall be released from the impounded waters, when the flow of the Connecticut river at Sunderland, Massachusetts (a town about 20 miles north of the confluence of the Chicopee and Connecticut rivers), is 4650 cubic feet per second or less; and, when said flow of the Connecticut river is more than 4650 and less than 4900 cubic feet per second, 70 cubic feet per second shall be released.

The Secretary of War finds that no impairment of the navigable capacity of the Connecticut river will result from these diversions and furthermore that a discharge of 4900 cubic feet per second at Sunderland corresponds to an average lower low tide gauge height of 2.1 and a discharge of 4650 cubic feet per second at Sunderland to an average lower low tide gauge height of 2.0 at Hartford.

Mean annual discharge of Connecticut river at Massachusetts-Connecticut boundary about 17,000 cubic feet per second.

Mean annual discharge of Swift river at proposed reservoir about 300 cubic feet per second (Reprint of Answer, p. 97).

FILE COPY

In the

Supreme Court of the United States.

OCTOBER TERM, 1929.

No. 13, ORIGINAL.

THE STATE OF CONNECTICUT

v.

THE COMMONWEALTH OF MASSACHUSETTS.

PAMPHLET CONTAINING CHARTS OF STREAM FLOW ON CONNECTICUT AND SWIFT RIVERS FOR USE AS CHALKS.

JOSEPH E. WARNER,
Attorney General of Massachusetts.
BENTLEY W. WARREN,
Special Assistant Attorney General.
GERALD J. CALLAHAN,
Assistant Attorney General,
R. AMMI CUTTER,
Assistant Attorney General.

ADDISON C. GETCHELL & SON, LAW PRINTERS, BOSTON.

In the

Supreme Court of the United States.

OCTOBER TERM, 1929.

No. 13, ORIGINAL.

THE STATE OF CONNECTICUT

v.

THE COMMONWEALTH OF MASSACHUSETTS.

PAMPHLET CONTAINING CHARTS OF STREAM FLOW ON CONNECTICUT AND SWIFT RIVERS FOR USE AS CHALKS.

The attached charts of stream flow in 1923 and in 1928 are presented as chalks to illustrate the allegations of the bill and of the answer and the arguments in the Massachusetts brief. They are offered as diagrams fairly representative of extreme wet and dry flow conditions on the *Connecticut* river at the point where it leaves Massachusetts and enters the State of Connecticut. The charts are not now offered as evidence, although, if there are later hearings before the Special Master, these and similar graphs of stream flow for as many years in the past as possible will doubtless be presented in evidence and duly authenticated. For the moment, however, these charts are intended only to supplement the explanations of the Massachusetts project and of the War Department findings made by counsel in argument and brief.

Each chart presents two graphs representing the quantity of water flowing in the *Connecticut* river at the Massachusetts–Connecticut state line throughout an entire calendar year. One chart shows the flows that were recorded in the wet year 1928, and the other in the dry year 1923. These years were selected to represent wet and dry conditions respectively during the summer and fall months only, when the question of wetness and dryness is most important. The average rate of flow during each calendar week throughout the year is represented by the height of the column for that week, that is, the height of the area shaded by cross-hatching, including also any area shaded in solid black.

On each graph is shown the effect that the authorized diversions would have had upon the flow of the *Connecticut* river had they been operative in those years. The graph at the left on each chart shows the effect of the diversions authorized by Massachusetts legislation without regard to the modifications and requirements of the War Department; the graph at the right shows the effect of these diversions authorized by Massachusetts legislation as they have been modified by the limitations and requirements of the War Department.

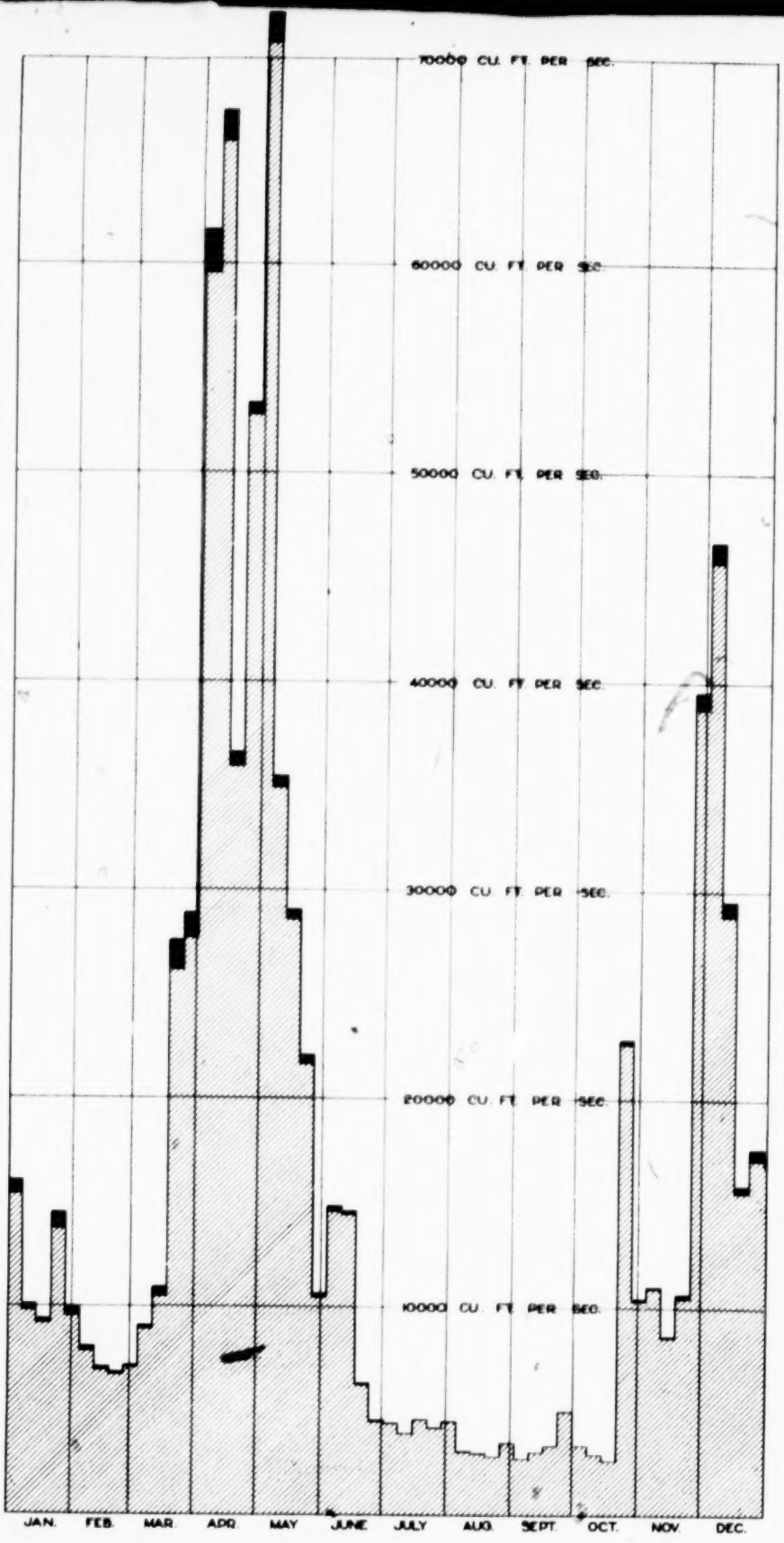
At the top of each weekly column the area shaded in solid black indicates the amount by which the flow in the *Connecticut* river would have been decreased by the authorized diversions from both *Ware* and *Swift* rivers, had the Massachusetts project then been in operation. It will be noted that the amount of this diversion decreases generally with the decrease of the total amount flowing in the river, and that at times of low flow it is negligible, being in fact represented by the thickness of the very thin black line across the top of each weekly column. In each of those weeks in which the net result of the diversions authorized by the Massachusetts legislation as modified by the re-

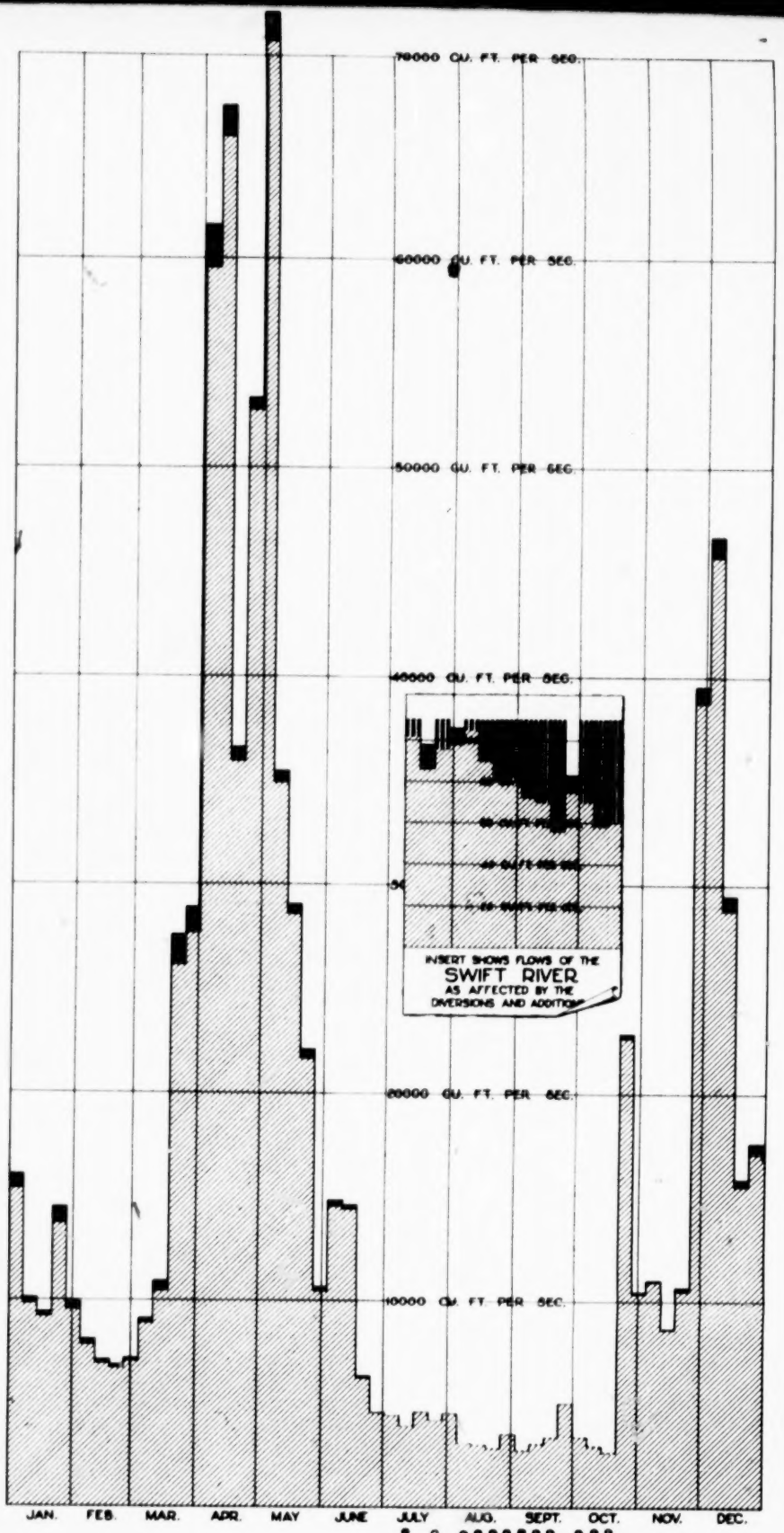
quirements of the War Department would have resulted in an increase instead of a decrease in the flow of the river, a broken or dotted line has been drawn across the top of the column, instead of a full line, and the thickness of this broken or dotted line represents the amount by which the flow would have been increased.

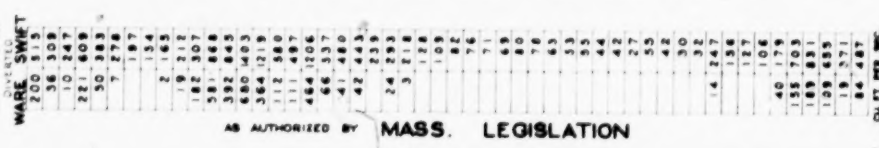
What the War Department officials consider a low flow or a dry season flow in the *Connecticut* river at the Massachusetts–Connecticut state line is indicated by the terms of the decision of the Department waiving objection to the diversion of *Swift* river flows. They have set a limit of 4900 cubic feet per second at the Sunderland Gauging Station of the United States Geological Survey where the drainage area is 8000 square miles, equivalent to about 5950 cubic feet per second at the Massachusetts–Connecticut state line where the drainage area is 9722 square miles, corresponding to the flows shown on these charts. For all flows above this limit the War Department is satisfied to allow the entire diversion of the *Swift* river flows as authorized by the Massachusetts legislation. When the flow in the *Connecticut* river at Sunderland falls below this point, Massachusetts must augment the flow in the *Swift* river.

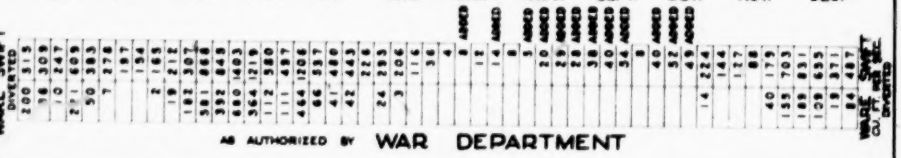
Because the effect of the proposed diversions on the flow of the *Connecticut* river is so insignificant, particularly during dry seasons, an insert has been added to the 1923 graph in order to make it visible on the chart. This insert shows the effect of the project on the flow of the *Swift* river at the proposed point of diversion, for a period corresponding to the period during which the flow of the *Connecticut* river is indicated immediately below. The drainage area of the *Swift* river is less than two per cent of that of the *Connecticut* river. In order to show distinctly the effect upon the flow of the *Swift* river of the diversions as modified by the requirements of the War Department, it has been necessary

to use a considerably larger scale on which to plot these flows. The flow of the *Swift* river and the quantities diverted or added are represented in cubic feet per second in a manner similar to that used in the larger graphs of the *Connecticut* river, the area shaded in solid black showing the amount by which the flow of the *Swift* river would have been decreased (had the Massachusetts project as modified by the War Department findings been in operation) and the area with broken shading or vertical bands showing the amount by which the flow of the *Swift* river would have been increased because of the requirements of the War Department.







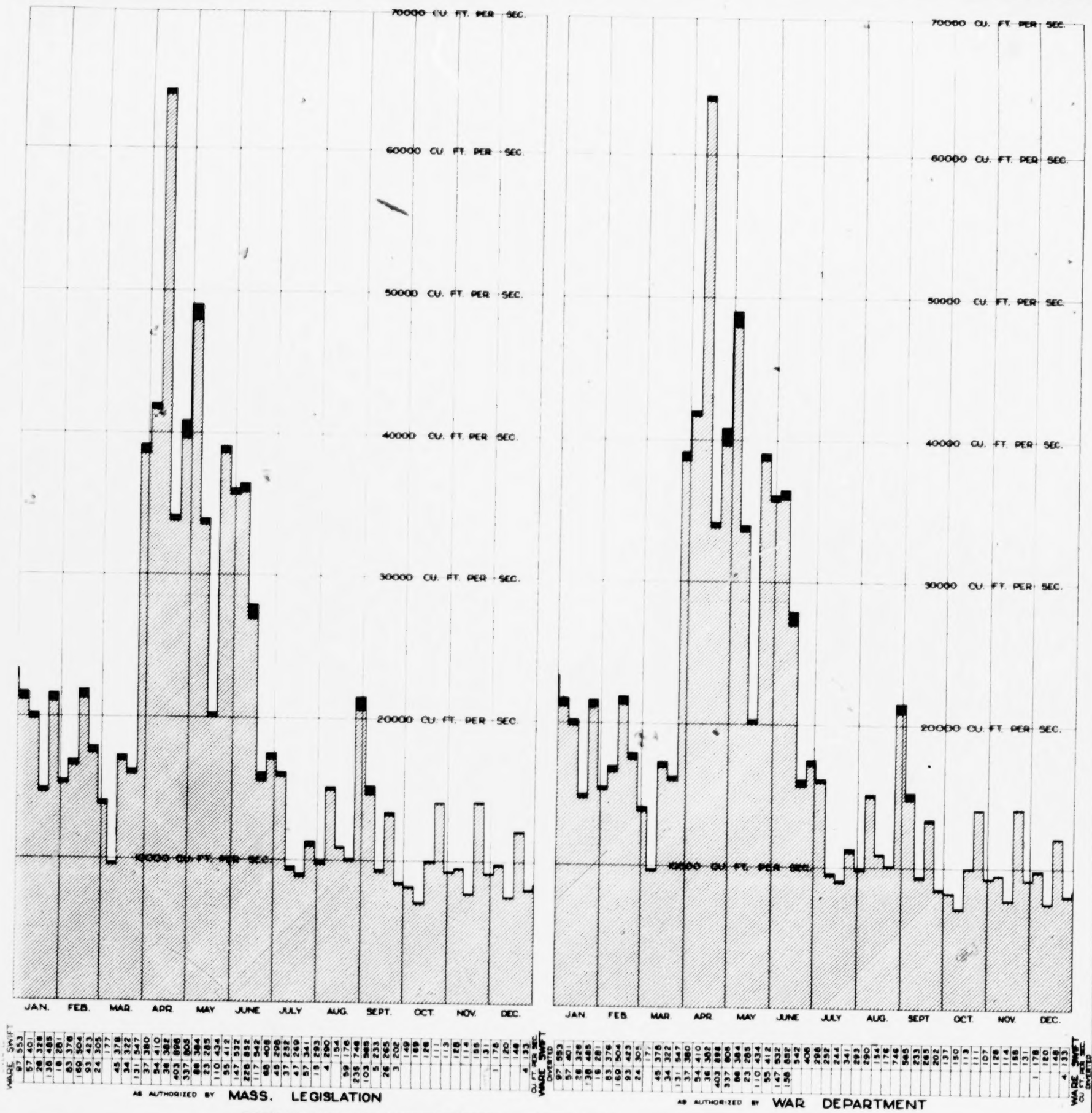


COMMONWEALTH OF MASSACHUSETTS ~ METR. DISTR. WATER SUPPLY COMMISSION

RELATION OF AUTHORIZED DIVERSIONS TO THE FLOW OF THE CONNECTICUT RIVER IN THE DRY YEAR 1923

WEEKLY AVERAGE FLOWS AT THE MASS.- CONN. STATE LINE

DIVERSIONS SHOWN THUS: ▥ ADDITIONS TO FLOW SHOWN THUS: ▨



WARE SWIFT — CU. FT. PER SEC. DIVERTED

JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
97 553	57 401	26 328	36 485	16 281	83 376	169 904	93 423	24 305	177		
45 378	34 322	131 547	37 380	54 410	36 382	403 896	337 805	88 384	23 285	55 412	147 532
226 852	117 542	68 408	45 296	37 252	47 269	57 341	18 293	4 290	154	59 176	235 746
103 965	5 233	26 265	3 202	149	189	128	111	113	120	114	185
131	176	1	120	148	4 133						

AS AUTHORIZED BY MASS. LEGISLATION

WARE SWIFT — CU. FT. PER SEC. DIVERTED

JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
97 593	57 401	26 328	36 485	16 281	83 376	169 904	93 423	24 305	17		
45 378	34 322	131 547	37 380	54 410	36 382	403 896	337 805	88 384	23 285	110 434	147 532
150 852	542	406	296	232	244	341	293	290	154	176	746
585	233	285	202	137	130	113	111	107	128	114	185
131	178	1	120	148	4 133						

AS AUTHORIZED BY WAR DEPARTMENT

COMMONWEALTH OF MASSACHUSETTS ~ METR. DISTR. WATER SUPPLY COMMISSION

RELATION OF AUTHORIZED DIVERSIONS TO THE FLOW OF THE CONNECTICUT RIVER IN THE WET YEAR 1928

WEEKLY AVERAGE FLOWS AT THE MASS. - CONN. STATE LINE

DIVERSIONS SHOWN THUS: [▭] ADDITIONS TO FLOW SHOWN THUS: [▭] (NONE IN THIS WET YEAR)

FILE COPY

SEP 29 80

In the

Supreme Court of the United States.

OCTOBER TERM, 1930.

No. 12. ORIGINAL.

THE STATE OF CONNECTICUT

v.

THE COMMONWEALTH OF MASSACHUSETTS.

DEFENDANT'S DISCLAIMER OF INTENTION TO FILE EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER.

JOSEPH E. WARNER,
Attorney General of Massachusetts.
BENTLEY W. WARREN,
Special Assistant Attorney General of Massachusetts.
GERALD J. CALLAHAN.
R. AMMI CUTTER.

ADDISON C. GETCHELL & SON, LAW PRINTERS, BOSTON.

In the

Supreme Court of the United States.

OCTOBER TERM, 1930.

No. 12, ORIGINAL.

THE STATE OF CONNECTICUT

v.

THE COMMONWEALTH OF MASSACHUSETTS.

DEFENDANT'S DISCLAIMER OF INTENTION TO FILE EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER.

And now comes the defendant, The Commonwealth of Massachusetts, and says that it does not desire to file any exception or objection to the report of the Special Master, the Honorable Charles W. Bunn, which report has heretofore been filed by leave of this Honorable Court.

THE COMMONWEALTH OF MASSACHUSETTS.

By JOSEPH E. WARNER,
Attorney General,
By BENTLEY W. WARREN,
Special Assistant Attorney General,
GERALD J. CALLAHAN,
R. AMMI CUTTER.

FILE COPY

29
SEP 30 193
CHARLES ELMORE CR

In the Supreme Court of the United States.

OCTOBER TERM, 1930.

No. 12, ORIGINAL.

THE STATE OF CONNECTICUT
v.
THE COMMONWEALTH OF MASSACHUSETTS.

MOTION FOR ORDER SETTING CASE DOWN FOR ARGUMENT AND TO ADVANCE FOR ARGUMENT.

JOSEPH E. WARNER,
Attorney General of Massachusetts.
BENTLEY W. WARREN,
Special Assistant Attorney General of Massachusetts.
GERALD J. CALLAHAN.
R. AMMI CUTTER.

ADDISON C. GETCHELL & SON, LAW PRINTERS, BOSTON.

In the
Supreme Court of the United States.

OCTOBER TERM, 1930.

No. 12, ORIGINAL.

THE STATE OF CONNECTICUT

v.

THE COMMONWEALTH OF MASSACHUSETTS.

NOTICE.

To the State of Connecticut, the complainant herein; to the Honorable Benjamin W. Alling, Attorney General of said State; and to Ernest L. Averill, Esq., and to Benedict M. Holden, Esq., both of Hartford, Connecticut, of counsel in said case:

Please take notice that at the incoming of the Supreme Court of the United States at twelve o'clock noon at the Capitol Building in the City of Washington, District of Columbia, on Monday, October 6, 1930, or as soon thereafter as counsel can be heard, the above-named defendant will appear by its attorneys and present to said court the attached motion for an order setting the above entitled case down for argument and for an order to advance the said case for argument.

THE COMMONWEALTH OF MASSACHUSETTS,

By JOSEPH E. WARNER,
Attorney General,

By BENTLEY W. WARREN,
Special Assistant Attorney General,

GERALD J. CALLAHAN,

R. AMMI CUTTER.

In the
Supreme Court of the United States.

OCTOBER TERM, 1930.

No. 12, ORIGINAL.

THE STATE OF CONNECTICUT

v.

THE COMMONWEALTH OF MASSACHUSETTS.

MOTION FOR ORDER SETTING CASE DOWN FOR ARGUMENT AND TO ADVANCE FOR ARGUMENT.

And now comes the defendant, The Commonwealth of Massachusetts, and moves that the above-entitled case be set down by order of this Honorable Court for oral argument at the earliest date possible upon the complainant's exceptions to the report of the Special Master and that an order be entered by this Honorable Court directing each of the parties to file briefs on or before days certain prior to the date upon which the said case is set down for oral argument.

THE COMMONWEALTH OF MASSACHUSETTS,

By JOSEPH E. WARNER,
Attorney General,
By BENTLEY W. WARREN,
Special Assistant Attorney General,
GERALD J. CALLAHAN,
R. AMMI CUTTER.

FILE COPY

Office Supreme Court, U. S.
FILED
OCT 6 1930
CHARLES ELMORE CROPLEY
CLERK

In the

Supreme Court of the United States.

OCTOBER TERM, 1930.

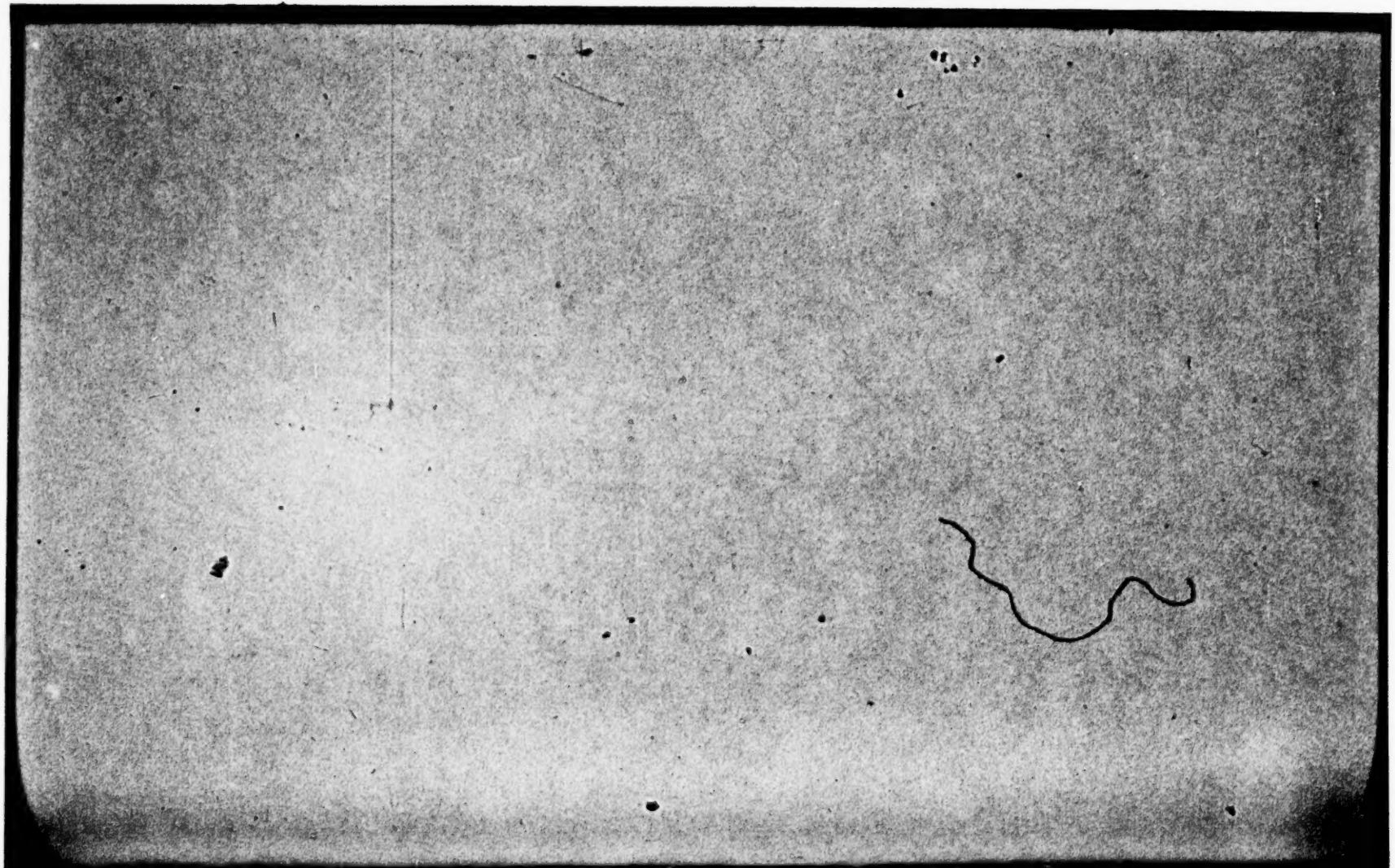
No. 12, ORIGINAL.

THE STATE OF CONNECTICUT
v.
THE COMMONWEALTH OF
MASSACHUSETTS.

STATEMENT IN SUPPORT OF DEFENDANT'S MOTION TO ADVANCE.

JOSEPH E. WARNER,
Attorney General of Massachusetts.
BENTLEY W. WARREN,
Special Assistant Attorney General.
GERALD J. CALLAHAN.
R. AMMI CUTTER.

ADDISON C. GETCHELL & SON, LAW PRINTERS, BOSTON.



In the

Supreme Court of the United States.

OCTOBER TERM, 1930.

No. 12, ORIGINAL.

THE STATE OF CONNECTICUT

v.

THE COMMONWEALTH OF MASSACHUSETTS.

STATEMENT IN SUPPORT OF DEFENDANT'S MOTION TO ADVANCE.

The above-entitled case is a bill in equity brought by the State of Connecticut against the Commonwealth of Massachusetts, seeking to enjoin the diversion of a portion of the waters of two small streams, tributary to the Connecticut River. The purpose of the proposed diversion is to supply the City of Boston and the Metropolitan District about Boston with an adequate supply of pure drinking water.

The case has been referred by this Honorable Court to the Honorable Charles W. Bunn, as Special Master, and the Special Master has filed a report recommending that the bill be dismissed. The defendant is informed that the complainant proposes to file exceptions to the report of the Special Master. The defendant has disclaimed any intention of filing any exceptions to the said report.

The serious situation immediately confronting the City of Boston and the officials in charge of supplying said city and the Metropolitan District around said city with a pure supply of drinking water is fully set out in the affidavit of Davis B. Keniston, Chairman of the Metropolitan District Commission, hereunto annexed. That situation is the basis of the defendant's request that the above-entitled case be advanced for argument on the complainant's exceptions to the report of the Special Master.

Respectfully submitted,

JOSEPH E. WARNER,
Attorney General of Massachusetts.
BENTLEY W. WARREN,
Special Assistant Attorney General.
GERALD J. CALLAHAN.
R. AMMI CUTTER.

In the

Supreme Court of the United States.

OCTOBER TERM, 1930.

No. 12, ORIGINAL.

THE STATE OF CONNECTICUT

v.

THE COMMONWEALTH OF MASSACHUSETTS.

AFFIDAVIT OF DAVIS B. KENISTON IN SUPPORT OF DEFENDANT'S MOTION TO ADVANCE.

I, Davis B. Keniston, being duly sworn make oath and depose as follows: I am chairman of the Metropolitan District Commission, existing by virtue of General Laws of the Commonwealth of Massachusetts, chapter 28, section 1 and acts in addition thereto and in amendment thereof. Said Metropolitan District Commission has charge of the operation and management of the public water supply furnished to the City of Boston and the Metropolitan District surrounding said city.

The principal source of supply of said Metropolitan District is now the Wachusett Reservoir situated in Clinton, Massachusetts. Because of the prolonged drought during the year 1929 and during the year 1930 up to and including the date of this affidavit, the water supply in

the Wachusett Reservoir has been greatly diminished. On September 30, 1930 said reservoir stood at a lower level than at any time since it was first put into service and contained only 29,000,000,000 gallons of water, 10,000,000,000 gallons of which cannot be used without imperiling the health and safety of the public. The full capacity of this reservoir is 65,000,000,000 gallons. The average rate of consumption of the water from this reservoir is at the present time, 140,000,000 gallons a day.

The project, which is the subject of contention in the above entitled case involving the transfer of flood waters from the watershed of the Ware River and of certain water from the watershed of the Swift River, has been adopted by the Commonwealth of Massachusetts as a method of augmenting the supply of water of the City of Boston. In view of the depleted state of the present supply the City of Boston will be faced with a grave and severe emergency, if waters from the watershed of the Ware River cannot be transferred into the Wachusett Reservoir by the early spring of 1931.

Subscribed at Boston, Suffolk County, Commonwealth of Massachusetts this 1st day of October 1930.

DAVIS B. KENISTON

THE COMMONWEALTH OF MASSACHUSETTS

SUFFOLK, ss. OCTOBER 1, 1930

Then appeared the above named Davis B. Keniston, personally known to me and being duly sworn made oath that the foregoing statement by him subscribed is true.

Before me

(Notarial Seal) HARVEY E. WEIR

Notary Public

My Commission Expires Feb. 20, 1931

THE COMMONWEALTH OF MASSACHUSETTS

OFFICE OF THE SECRETARY

Boston Oct. 2, 1930

I hereby certify, That at the date of the attestation hereto annexed, Harvey E. Weir whose name is signed to the attached certificate of acknowledgment, proof or affidavit, was at the time of taking the same, a Notary Public for the said Commonwealth duly commissioned and constituted; that to his acts and attestations, as such, full faith and credit are and ought to be given in and out of court; that as such Notary Public, he is by law authorized to administer oaths and take acknowledgments of deeds or conveyances of lands, tenements or hereditaments and other instruments throughout the Commonwealth to be recorded according to law; and that I verily believe his signature to the annexed attestation to be genuine.

In Testimony of which, I have hereunto affixed the GREAT SEAL OF THE COMMONWEALTH the date above written.

(Great Seal of the Commonwealth)

F. W. COOK,
Secretary of the Commonwealth.

FILE COPY

OCT 9 19

In the

Supreme Court of the United States.

OCTOBER TERM, 1930

No. 12, ORIGINAL.

THE STATE OF CONNECTICUT
COMPLAINANT
v.
THE COMMONWEALTH OF MASSACHUSETTS,
DEFENDANT

IN EQUITY

STATEMENT IN REPLY TO DEFENDANT'S MOTION TO ADVANCE

BENJAMIN W. ALLING,
Attorney General of the State of Connecticut.
ERNEST W. AVERILL,
Deputy Attorney General of the State of Connecticut.
BENEDICT M. HOLDEN,
Special Counsel.

THE CASE, LOCKWOOD & BRAINARD CO.
HARTFORD, CONN.

In the

Supreme Court of the United States.

OCTOBER TERM, 1930

No. 12, ORIGINAL.

THE STATE OF CONNECTICUT,
v.
THE COMMONWEALTH OF MASSACHUSETTS

STATEMENT IN REPLY TO DEFENDANT'S MOTION TO ADVANCE

The Court having directed counsel to file statement in connection with the "Motion For Order Setting Case Down For Argument And To Advance For Argument," and the affidavit, "Statement In Support Of Defendant's Motion To Advance," the attached is

Respectfully submitted,

THE STATE OF CONNECTICUT

By BENJAMIN W. ALLING,
Its Attorney-General.

ERNEST L. AVERILL,
Deputy Attorney-General.
BENEDICT M. HOLDEN,
Special Counsel.

In the

Supreme Court of the United States.

OCTOBER TERM, 1930

No. 12, ORIGINAL.

THE STATE OF CONNECTICUT
v.
THE COMMONWEALTH OF MASSACHUSETTS

STATEMENT IN REPLY TO DEFENDANT'S MOTION TO ADVANCE

Notice of the order setting case down for argument and to advance for argument, to be made October 6, 1930, was duly served upon and received by counsel for the complainant.

A conference between the Attorneys was held in Boston, Massachusetts, on Friday, October 3, 1930, at which conference it was agreed that counsel on both sides would exert themselves to expedite the preparation for printing and filing of a condensed statement of evidence, which has not yet been completed, and it was generally understood that the Court would not set the cause for hearing on any day prior to the re-convening of the Court after the "Thanksgiving Recess," and possibly not before the January term 1931.

Counsel from the Commonwealth of Massachusetts stated that they would ask for an early date, and counsel for the State of Connecticut stated that they would not make any objections to the Court setting the case for argument at some date subsequent to the "Thanksgiving Recess."

The next day, counsel for the State of Connecticut received printer's proof for an affidavit of David B. Keniston in support of the defendant's motion to advance. Nothing was said of this affidavit during the conference on the day previous. The affidavit on page 4 sets forth:

> "The project which is the subject of contention in the above entitled case involving the transfer of *flood waters* from the watershed of the Ware River. . . . "

Further on in the affidavit it is set forth:

> " . . . . . the City of Boston will be faced with a grave and severe emergency, if *waters* from the watershed of the Ware River cannot be transferred into the Wachusett Reservoir by the early spring of 1931."

Counsel for Connecticut claims that the evidence shows that Massachusetts has proceeded with its construction and is not being seriously delayed by the pending litigation.

The growth in population and in water consumption in the City of Boston has been normal, in fact the amount of water consumed has not been very materially increased in recent years. The problem of an additional supply had been the subject of a study for a great many years, and as affecting the affidavit of Mr. Keniston, we submit the following excerpt from an exhibit in the case, which is a report of a Joint Board relative to the Water Supply Needs and Resources of the Commonwealth of Massachusetts, filed with the Great and General Court of the Commonwealth of Massachusetts, designated as House Document No. 1550, dated January, 1922, which report sets forth:

> "Since the Wachusett Reservoir first filled in 1908 there has been an abundant supply of pure

water for all the inhabitants of the district. The reservoir has filled and overflowed in nine of the fourteen years. *During this period in several years the amount of water wasted, because all the reservoirs were overflowing, has nearly equalled the amount delivered into the aqueducts for use; and in two years the amount wasted has exceeded the amount used.* The largest reservoir alone holds a supply approximately sufficient to care for the needs of the entire district for one and one-half years, even if no rain fell during that period, eliminating evaporation from this calculation. The total storage capacity is so great that the district easily passed through four successive dry years, 1908-11, the period of lowest water yield since the Sudbury records were started in 1875, and in the last of the four years the Wachusett Reservoir was drawn down only 17 feet, and promptly overflowed the following spring." (Italics ours.)

The Complainant respectfully asks that an order be made and entered directing counsel to file an abstract of the evidence by November 15, 1930, and further directing the counsel to file briefs in court and exchange briefs with counsel by December 1, 1930. Reply briefs, if any, be filed not later than December 15, 1930, and that the cause be set for argument as soon after January 1, 1930, as the Court can conveniently hear the parties.

STATE OF CONNECTICUT,
By BENJAMIN W. ALLING,
Its Attorney-General.

ERNEST L. AVERILL,
Deputy Attorney-General.
BENEDICT M. HOLDEN,
Special Counsel.

FILE COPY

FILED
DEC 15 19
CHARLES ELMORE C

In the

Supreme Court of the United States.

OCTOBER TERM, 1930.

No. 12, ORIGINAL.

THE STATE OF CONNECTICUT,
COMPLAINANT AND EXCEPTING PARTY,
v.
THE COMMONWEALTH OF MASSACHUSETTS,
DEFENDANT.

BRIEF OF MASSACHUSETTS UPON COMPLAINANT'S EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER.

JOSEPH E. WARNER,
Attorney General of Massachusetts.
BENTLEY W. WARREN,
Special Assistant Attorney General.
GERALD J. CALLAHAN.
R. AMMI CUTTER.

Of Counsel:
MANLEY O. HUDSON.

ADDISON C. GETCHELL & SON, LAW PRINTERS, BOSTON.

In the

Supreme Court of the United States.

OCTOBER TERM, 1930.

No. 12, ORIGINAL.

THE STATE OF CONNECTICUT,
COMPLAINANT AND EXCEPTING PARTY,

v.

THE COMMONWEALTH OF MASSACHUSETTS,
DEFENDANT.

BRIEF OF MASSACHUSETTS UPON COMPLAINANT'S EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER.

JOSEPH E. WARNER,
Attorney General of Massachusetts.
BENTLEY W. WARREN,
Special Assistant Attorney General.
GERALD J. CALLAHAN.
R. AMMI CUTTER.

Of Counsel:
MANLEY O. HUDSON.

ADDISON C. GETCHELL & SON, LAW PRINTERS, BOSTON.

SUBJECT INDEX.

	Page
SHORT STATEMENT OF THE CASE	1
The course of procedure in the case	1
The Special Master's Report	2
The joint summary of the evidence	2
STATEMENT OF FACTS	3
General facts	3
The Massachusetts project and Boston's need of more water	3
The Massachusetts legislation	5
The Massachusetts legislation as modified by the War Department findings	5
Ware River	6
Massachusetts legislation	6
War Department findings	6
Swift River	6
Massachusetts legislation	6
War Department findings	7
Statistical data	7
The pleadings	9
The Connecticut bill	9
The Massachusetts answer	10
The amendments to the answer	11
Connecticut's reply	12
The Special Master's Report	12
Preliminary questions of law	12
Findings of fact as to alleged damage to Connecticut	13
1. Navigation	13
2. Agriculture and inundated land	13
3. Power project	14
4. Shad and other fish life	14
5. Alleged increased pollution due to proposed diversion	15
Findings of fact as to whether Boston ought to be compelled to take its domestic water supply from Northeastern Massachusetts	15
The Connecticut exceptions summarized	16 to 20
SUMMARY OF ARGUMENT	21 to 25
POINTS AND AUTHORITIES	25
I. The Special Master correctly found that Connecticut has not proved that that State or its citizens will	

Page

suffer any appreciable or substantial damage as the result of the execution of the Massachusetts project. He properly recommended that no injunction should be granted in the absence of such proof 25

A. In order to be entitled to relief by injunction, Connecticut in this suit in equity against another *quasi*-sovereign State must prove damage of serious magnitude to her sovereign rights or to interests which she represents as *parens patriae* 25

B. The complainant State in a suit such as the case at bar must show present or presently threatened damage to existing interests 27

C. The Massachusetts project is contained in the Massachusetts legislation as modified by the War Department findings. It involves no diversion of waters from rivers other than the Ware and the Swift. Massachusetts must obey the War Department findings while they remain in force 30

1. The statutes themselves authorize no diversion from any rivers but the Ware River and the Swift River 30

Ware River Act 30

Swift River Act 31

The legislative reports 34

The 1895 report 35

House Document (1922) No. 1550 36

2. Massachusetts not only proposes to comply with the War Department rulings; it must do so 39

D. The findings of the Special Master, not only warranted, but compelled by the weight of the evidence, show that the Ware–Swift project will cause no material injury to present Connecticut interests. Any injury suffered is *de minimis* 41

1. There is no proof of injury to existing interests of navigation 41

2. There will be no injury to Connecticut because of increased pollution of the Connecticut River if the Massachusetts project is carried out ... 52

3. Agriculture in Connecticut will not be damaged in measurable degree by the Massachusetts project 57

Page

The stipulation 58
Comments on particular Connecticut exceptions as to alleged agricultural damage 62
4. No existing Connecticut power plant will be affected by the Massachusetts project. Complete compensation for any injury to potential future developments can be made by the payment of money damages 63
An adequate remedy at law 65
A common law remedy 67
The power company is not foreclosed from further relief 68
The Connecticut exceptions as to power 69
5. Fish life in the Connecticut River will not be affected by the Massachusetts project 71

II. The action of the Secretary of War and the Chief of Engineers upon the applications for the approval of the contemplated diversions constituted a proper performance of the duties delegated to them by the Act of Congress of March 3, 1899. That action, by deciding that the diversion is not objectionable (within the limits specified in the War Department findings) so far as navigation is concerned, forecloses any contention of Connecticut that the diversion will injure navigation 74

A. Congress under the Constitution has full power to authorize diversions such as those in the present case, and its determination with respect to such diversions is final 75

B. Congress can properly delegate to the Secretary of War and to the Chief of Engineers this power to determine whether diversions such as those in the case at bar affect navigation. It has done so by the Act of March 3, 1899 77
The Wisconsin Case 79
Contemporary construction of section 10 81
Summary of the Wisconsin case 82

C. The Secretary of War, upon recommendation of the Chief of Engineers, has validly authorized the Ware and Swift River diversions with certain limitations and restrictions 84

Page

The Massachusetts project is an affirmative aid to navigation 85
Action of the Chief of Engineers and of the Secretary of War with reference to diversions of Ware and Swift Rivers 86
The Ware River finding 86
The Swift River finding 89
Comments on Connecticut's exceptions as to the law on navigation 90

D. With reference to all questions as to the effect of the Massachusetts project upon navigation the action of the Secretary of War is as conclusive and final as the action of Congress would have been, inasmuch as the Secretary acted in good faith and conformed to all statutory requirements and conditions 92
Only the navigability issue is concluded by the War Department findings 97

III. The Special Master was correct in ruling that the principle of "equality of right" controlled the use of the Connecticut River by the States through which it flows. Massachusetts is entitled to make a reasonable use of the waters of the Connecticut River, including the right to appropriate permanently an equitable portion of its waters 98

A. The law applicable to the case at bar is to be determined by this Honorable Court in the light of the whole situation of fact; having due regard to the decisions of this Court in other interstate cases, to the municipal law in force in Massachusetts and Connecticut, to pertinent provisions of international law and practices, and to the customary methods of obtaining and using water in the two States here involved. No one of these factors is all-important 99
The right of a State to sue as *parens patriae* 100
The application of international law 103

B. The decisions of this Court establish the principle of the equitable division of the benefits arising from an interstate river among the States through which the river passes. This doctrine, referred to by the

Page

Special Master as the rule of "equality of right," is applicable to the case at bar, provided that Connecticut had proved damage or injury of serious magnitude 106
Missouri v. Illinois 106
Kansas v. Colorado 107
The doctrine of equitable division applied 109
Wyoming v. Colorado 110
The Drainage Canal case 112
The final decree in the Chicago Drainage Canal case recognizes the prior claim of water supply 113

C. International law establishes the principle of equitable division of the benefits of interstate waters as between the sovereigns through whose lands the waters pass. In making an equitable division of beneficial use, due weight must be given to the comparative benefit to be derived by each sovereign from each particular use. The fundamental and most important use of water is for quenching thirst and for other domestic purposes 114
The development of international law as to uses of water 115
The priority of use doctrine recognized 116
Preference to municipal water supplies 117
A pending equitable division 119
Foreign interstate litigation precedents 120
Summary—Equitable division is the guiding principle 120

D. Under the municipal law both of Connecticut and of Massachusetts, so far as it furnishes an analogy of weight in this case, the Massachusetts project would be deemed reasonable 121

1. Under the riparian law in force both in Massachusetts and in Connecticut a riparian owner is entitled to make a reasonable use of the waters flowing past his land, having due regard for the interests of upper and lower riparian owners upon the same stream 121

2. Connecticut habitually permits diversions of streams to other watersheds for the purpose of supplying municipalities with water for domes-

Page

tic use. Connecticut in equity cannot complain if Massachusetts makes reasonable use of interstate waters arising within her borders for similar purposes, even if a diversion be necessary; provided Massachusetts does not permanently abstract more than the share of such interstate waters to which she is entitled under the doctrine of equal division of benefit 127

E. The Special Master was correct in finding that the Metropolitan District about Boston ought not to be compelled to resort to inferior, polluted, and inadequate waters said by Connecticut to be available in Eastern Massachusetts 134

1. The contention of Connecticut that Massachusetts has available supplies of water elsewhere than in the Ware and Swift Rivers is immaterial, unless this Court reverses the findings of fact of of the Special Master and decides that Connecticut has shown substantial damage resulting from some act of Massachusetts. In that event the evidence upon the existence of other water sources may be material as bearing upon the issue of whether this Honorable Court in equity ought to grant any specific or injunctive relief 134

2. Massachusetts has established, as the Special Master has found, that there are not adequate supplies of pure water in Eastern Massachusetts to meet the demands of the population of that region in the future, and that it is necessary to obtain the Ware–Swift supply chosen by the Massachusetts Legislature after due deliberation. Connecticut has not shown that the Special Master was incorrect in his conclusion that Boston ought not to be forced to adopt the inadequate schemes suggested by Connecticut for supplying the City with hazardous treated water from inadequate and polluted Eastern Massachusetts sources 136

Bases of objection to the Fifteen Watershed scheme 140

Bases of objection to the Merrimack River scheme 141

Page

The few Connecticut exceptions to findings of fact on this phase of the case 143
The exceptions to subsidiary findings as to the Eastern supply 144
The Special Master's general findings of fact as to the superiority of the Ware–Swift project and the objections to the Eastern sources stand unassailed by Connecticut 148
The exceptions as to burden of proof 151
Summary of water supply and demand testimony 153
The fundamental consideration 155
CONCLUSION 155

TABLE OF CASES CITED.

Alabama v. Georgia, 23 How. 505 103
Andrus v. Berkshire Power Co., 145 Fed. 47; 147 Fed. 76; 203 U.S. 596 133
Arkansas v. Tennessee, 246 U.S. 158 103
Balf Co. v. Hartford Electric Light Co., 106 Conn. 315 .. 125
Beckerle v. Danbury, 80 Conn. 124 125
Blodgett v. Holden, 275 U.S. 142 91
Brickett v. Haverhill Aqueduct Co., 142 Mass. 394 133
Brookline v. Mackintosh, 133 Mass. 215 126
Buddington v. Bradley, 10 Conn. 212 122
Chicago Drainage Canal Case, 281 U.S. 696 ..... 83, 113, 117
Chicago, R.I. & P. R. Co. v. Hardwick Farmers Elevator Co., 226 U.S. 426 76
Collins Mfg. Co. v. Wickwire Co., 14 Fed. (2d) 871 .. 122, 126
Connecticut v. Massachusetts, 279 U.S. 821 ..... 2, 95
Connecticut v. Massachusetts, 280 U.S. 523 2
Connecticut v. Massachusetts, 280 U.S. 532 2
DeWitt v. Bissell, 77 Conn. 530 126
Donnelly Brick Co. v. New Britain, 106 Conn. 167; 137 Atl. 745 ..... 123, 126
Duplex Co. v. Deering, 254 U.S. 443 35
East Hartford Fire District v. Glastonbury Power Co., 92 Conn. 217 131
Elliot v. Fitchburg R.R., 10 Cush. 191 ..... 122, 124
Everard's Breweries v. Day, 265 U.S. 545 35
Florida v. Mellon, 273 U.S. 12 ..... 27, 28

Page

Ford & Son v. Little Falls Co., 280 U.S. 369 94
Gillett v. Johnson, 30 Conn. 180 123
Harding v. Stamford Water Co., 41 Conn. 87 ..... 125, 126
Harris v. Mackintosh, 133 Mass. 228 126
Hazard Powder Co. v. Somersville Mfg. Co., 78 Conn. 171 122
Hittinger Fruit Co. v. Cambridge, 218 Mass. 220 123
Ingraham v. Dunnell, 5 Met. 118 126
Isbell v. Greylock Mills, 231 Mass. 233 ..... 122, 123, 124
Kansas v. Colorado, 185 U.S. 125 ..... 100, 103, 107
Kansas v. Colorado, 206 U.S. 46
13, 70, 95, 97, 100, 101, 103, 104, 107, 108, 110, 149
Keeney & Wood Mfg. Co. v. Union Mfg. Co., 39 Conn. 576
122, 123
Lawton v. Herrick, 83 Conn. 417 126
Louisiana v. Mississippi, 202 U.S. 1 103
Mannville Co. v. Worcester, 138 Mass. 89 ..... 67, 133
Martin v. Gleason, 139 Mass. 183 126
Mason v. Whitney, 193 Mass. 152 ..... 12[illegible]
Massachusetts v. Mellon, 262 U.S. 447 27
McNamara v. Taft, 196 Mass. 597 ..... 122, 126
Merrifield v. Lombard, 13 Allen 16 126
Missouri v. Illinois, 180 U.S. 208 ..... 100, 106
Missouri v. Illinois, 200 U.S. 496
12, 15, 26, 97, 100, 102, 103, 104, 105, 107
Missouri Pac. R. Co. v. Stroud, 267 U.S. 404 76
Monongahela Bridge Co. v. United States, 216 U.S. 177
27, 76, 93
Morgan v. Danbury, 67 Conn. 484 126
Nebraska v. Iowa, 143 U.S. 359 103
New Haven Water Co. v. Russell, 86 Conn. 361 131
New Jersey v. Sargent, 269 U.S. 328 ..... 14, 28, 69
New York v. Illinois, 274 U.S. 488 ..... 14, 28, 69
New York v. New Jersey, 256 U.S. 296 .. 12, 25, 100, 104, 112
Nolan v. New Britain, 69 Conn. 668 126
North Dakota v. Minnesota, 263 U.S. 365
12, 26, 62, 71, 100, 112, 155
Parker v. American Woolen Co., 195 Mass. 591 ..... 122, 126
Parker v. Griswold, 17 Conn. 288 ..... 122, 123
Parker v. Hotchkiss, 25 Conn. 321 123
Pennsylvania v. West Virginia, 262 U.S. 553 103
Platt Bros. & Co. v. Waterbury, 72 Conn. 531 126

Page

Port of Seattle v. Oregon R.R. Co., 255 U.S. 56 75
Richbourg Motor Company v. United States, 281 U.S. 528 35
Richmond Screw Anchor Co. v. United States, 275 U.S. 331 91
Roach v. Sturdy, 250 Mass. 357 122
Rockville, etc., Co., v. Koelsch, 90 Conn. 171 126
Rockport v. Elwell, 219 Mass. 287 126
Sanitary District v. United States, 266 U.S. 405 76
Sherlock v. Alling, 93 U.S. 99 76
Southern Pacific Co. v. Olympian Dredging Co., 260 U.S. 205 ..... 27, 76, 95
Stamford Extract Mfg. Co. v. Stamford Rolling Mills Co., 101 Conn. 310 ..... 56, 122, 126
Stratton v. Mount Hermon Boys' School, 216 Mass. 83 122, 123, 124, 125
Taft v. Bridgeton Worsted Co., 237 Mass. 385 122
United States v. Chandler-Dunbar Co., 229 U.S. 53 27, 75, 77
United States v. Missouri Pacific Railway, 278 U.S. 269 35
United States v. Rio Grande, etc., Co., 174 U.S. 690 .... 40, 83
United States v. River Rouge Improvement Co., 269 U.S. 411 97
United States v. Sanitary District, 266 U.S. 405 41
Water Commrs. v. Perry, 69 Conn. 461 122
Watson v. New Milford Water Co., 71 Conn. 442 125
Wier v. Covell, 29 Conn. 197 123
Wisconsin v. Illinois and Sanitary District, 278 U.S. 367 79, 81, 83, 91, 93, 94, 100, 103, 142
Wisconsin R.R. Comm. v. C., B. & Q. R.R. Co., 257 U.S. 563 35
Wyoming v. Colorado, 259 U.S. 419 . 13, 101, 103, 104, 110, 111

TABLE OF STATUTES CITED.

Act of March 3, 1899, § 9 ..... 18, 77, 82, 90, 91
Act of March 3, 1899, § 10 13, 18, 77, 80, 82, 83, 84, 85, 87, 90, 91
Act of May 13, 1924 119
Act of September 19, 1890 76
Conn. General Statutes, c. 131 128
Conn. General Statutes, § 2542 128
Conn. General Statutes, § 5181 128
Conn. Priv. Laws, vol. 4, pp. 1364, 1366 130

Page

Conn. Priv. Laws, vol. 5, p. 665 129
Conn. Spec. Acts (1919), c. 129 130
Conn. Spec. Acts (1919), c. 164 130
Conn. Spec. Acts (1925), c. 295 130
Conn. Spec. Acts (1925), c. 340 130
Conn. Spec. Acts (1927), c. 340 130
Conn. Spec. Laws, vol. 4, p. 1356 129
Conn. Spec. Laws, vol. 5, p. 244 129
Conn. Spec. Laws, vol. 5, p. 333 130
Conn. Spec. Laws, vol. 5, p. 673 130
Conn. Spec. Laws, vol. 9, p. 910 129
Conn. Spec. Laws, vol. 11, p. 38 129
Conn. Spec. Laws, vol. 12, p. 91 130
Conn. Spec. Laws, vol. 14, p. 323 130
Conn. Spec. Laws, vol. 15, p. 584 130
Conn. Spec. Laws, vol. 15, p. 971 129
Conn. Spec. Laws, vol. 16, p. 240 130
Conn. Spec. Laws, vol. 16, pt. 1, pp. 389-395 130
Gen. Laws, 1921, c. 79, as amended 31, 33, 36
House Document (1895), No. 500 35
House Document (1922), No. 1550 ..... 31, 36
House Document (1926), No. 900 38
Mass. Stat. 1926, c. 375 ..... 5, 6, 16, 30, 37, 65, 66, 87, 152
Mass. Stat. 1927, c. 321 ..... 5, 6, 7, 16, 30, 31, 37, 39, 66, 152
30 Stat. at L., 1151 ..... 18, 77
36 Stat. at L., 2448 117
43 Stat. at L., Part I, p. 118 119
44 Stat. at L., 2108 119
U.S. Code, Tit. 33, § 401 ..... 18, 77
U.S. Code, Tit. 33, § 403 ..... 18, 77

TABLE OF AUTHORITIES CITED.

Arrêts du Tribunal Fédéral Suisse, IV, p. 34 120
Arrêts du Tribunal Fédéral Suisse, XVIII, p. 689 120
Constitution of the United States, art. I, sec. 8, cl. 3 .. 75
Lake of Woods Agreement of 1925 ..... 119, 121
Mass. Op. Atty. Gen., vol. III, p. 596 133
Papers on the League of Nations 104
Special Master's Report, Wisconsin v. Illinois 93
U.S. Op. Atty. Gen., vol. 34, p. 410 ..... 81, 83

TABLE OF EXCEPTIONS CITED.

	Page
No. 1	16
No. 2	17, 43
No. 3	17, 43, 51
No. 4	17, 43, 51
No. 5	17, 30, 43
No. 6	17, 30, 41
No. 7	17, 40
No. 8	17
No. 9	17, 26, 99
No. 10	17, 99, 114
No. 11	17, 99, 114
No. 12	17, 99
No. 13	17, 99, 114
No. 14	17, 99, 114
No. 15	17, 99, 114
No. 16	17, 99
No. 17	39
No. 18	18
No. 19	17, 30
No. 20	17
No. 21	17, 99, 114
No. 22	17, 99, 114
No. 23	17
No. 24	17, 43, 51
No. 25	17, 51
No. 26	18, 51, 85, 90
No. 27	18, 51, 85
No. 28	18, 51
No. 29	18, 51, 90
No. 30	18, 51, 90
No. 31	18, 51, 90
No. 32	18, 51, 85
No. 33	18, 51, 85, 90
No. 34	18, 51, 90
No. 35	18, 51, 90
No. 36	18, 51
No. 37	18, 51
No. 38	18, 51
No. 39	18, 69
No. 40	18, 69

Page

No. 41 ..... 18, 69
No. 42 ..... 18, 70, 71
No. 43 ..... 18, 70, 71
No. 44 ..... 18, 71
No. 45 ..... 18, 69, 70, 71
No. 46 ..... 18, 69, 71
No. 47 ..... 19, 61
No. 48 ..... 19, 57, 62
No. 49 ..... 19, 57, 62
No. 50 ..... 19, 57, 62
No. 51 ..... 19, 26, 62
No. 52 ..... 19, 26, 62
No. 53 ..... 19, 26, 62
No. 54 ..... 19, 26, 52, 57
No. 55 ..... 19, 56, 57
No. 56 ..... 19, 26, 57
No. 57 ..... 19, 71
No. 58 ..... 20, 143, 144, 146
No. 59 ..... 20, 143, 146
No. 60 ..... , 20, 147
No. 61 ..... 20, 143, 151, 155
No. 62 ..... 20, 143, 151, 155
No. 63 ..... 20, 143, 151, 155
No. 64 ..... 20, 143, 151, 155
No. 65 ..... 20, 143, 151, 155
No. 66 ..... 20, 143
No. 67 ..... 20, 143, 151, 155
No. 68 ..... 20, 150, 151
No. 69 ..... 20, 150, 151
No. 70 ..... 20, 150, 151, 155
No. 71 ..... 20, 150
No. 72 ..... 20, 150
No. 73 ..... 20, 150, 151
No. 74 ..... 20, 150
No. 75 ..... 18, 20

TABLE OF REFERENCES TO SPECIAL MASTER'S REPORT CITED.

	Page
Page 2	3, 5, 8
Pages 2-3	4
Pages 2-6	3, 5, 12
Page 3	4, 5, 30, 151
Insert opposite page 3	3
Pages 3-4	6
Pages 4-5	8
Page 5	3, 9, 42, 125
Pages 6-7	12
Pages 6-12	99, 127
Page 7	62, 70, 155
Pages 7-9	13
Pages 8-9	110
Page 9	113
Pages 10-12	13
Page 11	111
Pages 11-12	113
Pages 12-17	13
Page 13	40, 88, 89
Pages 13-17	41
Pages 14-17	88, 89
Page 15	94
Page 17	85
Page 18	42, 86
Pages 18-19	13, 40
Page 19	43, 48, 58
Pages 19-20	14
Page 20	13, 57, 61, 62
Pages 20-21	14, 18, 29
Page 21	63, 68, 69
Page 22	71, 74
Pages 22-23	14
Page 24	55
Pages 24-28	15, 52
Page 28	15, 26, 52
Pages 28-29	155
Pages 29-30	151
Page 30	4, 16, 136, 139, 152
Pages 30-31	4

Page

Page 31 ..... 4, 136, 137, 151, 153
Pages 31-32 ..... 137, 139
Page 32 ..... 138, 140, 152, 153
Pages 32-35 140
Pages 33-52 148
Page 34 140
Pages 35-36 148
Page 36 ..... 140, 142
Pages 36-38 140
Page 37 ..... 141, 148, 151
Pages 37-38 ..... 141, 151
Page 38 ..... 141, 151
Pages 38-39 ..... 141, 151
Page 39 ..... 16, 135, 141, 148, 151
Page 40 ..... 141, 151
Pages 40-41 141
Pages 40-43 146
Pages 40-44 148
Pages 40-47 151
Page 41 ..... 141, 142, 151
Page 42 141
Page 43 ..... 141, 142, 151
Pages 43-44 151
Page 44 141
Page 45 ..... 141, 142, 146, 151
Pages 45-46 141
Pages 45-47 151
Page 46 ..... 141, 148
Page 47 ..... 142, 146, 148
Page 48 ..... 142, 143
Pages 48-49 142
Page 50 ..... 144, 151
Pages 50-51 ..... 142, 151
Page 51 155
Pages 51-52 ..... 16, 135, 139
Page 52 ..... 15, 141, 142, 148
Pages 52-53 29
Page 53 ..... 30, 39, 41
Pages 53-54 56
Page 54 ..... 2, 68

In the

Supreme Court of the United States.

OCTOBER TERM, 1930.

No. 12, ORIGINAL.

THE STATE OF CONNECTICUT,

COMPLAINANT AND EXCEPTING PARTY,

v.

THE COMMONWEALTH OF MASSACHUSETTS,

DEFENDANT.

BRIEF OF MASSACHUSETTS UPON COMPLAINANT'S EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER.

SHORT STATEMENT OF THE CASE.

THE COURSE OF PROCEDURE IN THE CASE.

This case was brought by the State of Connecticut against the Commonwealth of Massachusetts, under the original jurisdiction of this Court, to enjoin the use of waters of two streams, secondary tributaries of the Connecticut River, as a domestic water supply for the Metropolitan District about Boston, Massachusetts. On April

22, 1929, this Court (279 U.S. 821) denied Connecticut's motion to join the Secretary of War as a party defendant, and on December 2, 1929, referred the case to Hon. Charles W. Bunn as Special Master (280 U.S. 523) under a rule directing him "to make findings of fact and conclusions of law, and to submit the same to this Court with all convenient speed, together with his recommendations for a decree." On January 20, 1930, this Court (280 U.S. 532) from the bench denied Connecticut's motions to dismiss and to strike out the answer filed by Massachusetts.

The Special Master's Report.

The Special Master duly heard the testimony offered by the parties and on May 19, 1930, filed his report, which on every issue was favorable to the contentions of Massachusetts. He recommended that the bill of complaint filed by Connecticut be dismissed [Report of Special Master (hereinafter referred to as Rep. Sp. M.), 54]. This Court ordered the report to be filed (May 26, 1930). Massachusetts has disclaimed all intention to file any exceptions to the Special Master's Report. Connecticut has filed seventy-five exceptions to that report. The case now stands for argument upon these exceptions filed by Connecticut.

The Joint Summary of the Evidence.

The Joint Summary on file with this Court contains the following agreement: "This Joint Abstract of portions of the record, submitted by counsel for both parties, is designed to summarize within a reasonably small compass the evidence introduced upon issues on which The Special Master has made findings, to which the complainant has taken exception. Both parties desire to reserve the right, for the purpose of employing this summary to refer specifically in briefs and in argument to original exhibits and to the original transcript of the evidence, even though such

exhibits or such portions of the evidence are omitted from this summary by inadvertence or for the purpose of condensing the record" (Joint Sum. p. 1).

STATEMENT OF FACTS.

General Facts.

The Special Master found certain general facts (Rep. Sp. M. 2-6). [In considering this phase of the case the Court may find useful the large insert map at the back of the Special Master's Report and referred to by him on page 5 of his Report.]

The Massachusetts Project and Boston's Need of More Water.

[References are given not only to the Special Master's Report (Rep. Sp. M.) but frequently also to the Joint Summary of the Evidence (Joint Sum.) and to the original transcript of the evidence (Transcript) and exhibits.]

The Metropolitan Area surrounding the City of Boston is faced with "a serious water shortage in the near future and there is a real necessity for their making provision for a large quantity of additional water . . ." (Rep. Sp. M. 2). This Metropolitan Area consists of 20 cities and towns now members of the Metropolitan Water District, and of 15 other cities and towns, of each of which some part is within 10 miles of the State House in Boston (Transcript, p. 180), and all of which 15 cities and towns, though not now members of the Metropolitan Water District, are eligible to become members, and will probably do so in the near future. These 35 towns and cities have a total population of about 1,900,000 (Joint Sum. p. 158; Transcript, p. 133). Other cities and towns in Northeastern Massachusetts (Rep. Sp. M., insert opposite p. 3. These towns are situated in the geographical areas marked

on that insert "C," "E," and "F") must be considered in connection with the Metropolitan District not only because at some future time they will depend on the Metropolitan District water supply sources, but also because these populations in Northeastern Massachusetts must divide up, on principles of fair equality and of right, the water supply sources in that region, if waters from the Ware River and the Swift River be denied to Boston.

With reference to Southeastern Massachusetts the Special Master found that "the southeastern part of Massachusetts, including Cape Cod, seems to have sufficient supplies of water for itself and was not brought into the case" (Rep. Sp. M. 30). X. H. Goodnough, an expert witness for Massachusetts, stated that there was no surplus water in Southeastern Massachusetts available for the Metropolitan District (Joint Sum. p. 217; Transcript, p. 1586). Taking the needs of the population of Northeastern Massachusetts as a whole, the total population of the area "is now 2,860,000, estimated likely to reach a total in forty years [1970] of 4,572,000." The "whole region has a total present water supply of 343,000,000 gallons per day and a total consumption of 244,000,000 gallons per day, leaving a surplus of 99,000,000 gallons per day" (Rep. Sp. M. 3). By 1970 some of the present supplies, due to population growth, will have become impossible to use, and will probably have decreased from 343,000,000 gallons a day to 289,000,000 gallons a day, and estimated consumption requirements will probably have increased from 244,000,000 gallons a day to 467,000,000 gallons a day, leaving a 1970 deficit of 178,000,000 gallons a day (Joint Sum. p. 158). The present theoretical surplus of 99,000,000 gallons a day is distributed over a number of independent communities in small sources with no connections making their surplus mutually available. (See Rep. Sp. M. 2-3, 30-31, especially bottom of p. 31, where detailed figures of available water sources for Northeastern Massa-

chusetts, both in 1929 and in 1970, will be found.) The Special Master concludes, "There is no serious dispute about the need of this region to provide presently for additional water" (Rep. Sp. M. 3, Exhibit D-13; Joint Sum. pp. 158, 160).

The Massachusetts Legislation.

By the enactment of Mass. St. 1926, c. 375 (Reprint of Answer, pp. 36-51), and Mass. St. 1927, c. 321 (Reprint of Answer, pp. 51-80), the General Court of Massachusetts adopted a definite plan for obtaining an additional supply of water for the Metropolitan District. This plan involved the diversion into the Wachusett Reservoir (which is the principal present supply of Boston) of (*a*) flood waters of the Ware River as defined in section 4 of the 1926 Act, and (*b*) certain waters of the Swift River as defined in section 1 of the 1927 Act. Both of these streams are non-navigable tributaries of the Chicopee River, which is itself a non-navigable tributary of the Connecticut River (Rep. Sp. M. 2, 3). The Ware River and the Swift River are wholly within the geographical limits of Massachusetts (Reprint of Answer, p. 84; see Rep. Sp. M. 2).

The Massachusetts Legislation as Modified by the War Department Findings.

Because of an alleged possible effect of the proposed diversion upon navigation on the lower reaches of the Connecticut River, the Metropolitan District Water Supply Commission, at the suggestion of the District Engineer of the War Department (Reprint of Answer, pp. 81, 89), filed applications for War Department approval of the project authorized by the Massachusetts legislation. The provisions of the Massachusetts legislation and the modifications of these provisions made by the War Depart-

ment after hearing both sides are here set out in summary form (see Rep. Sp. M. 3-4).

Ware River.

Massachusetts Legislation.

The Massachusetts Legislature (by chapter 375 of the Acts of 1926) authorizes the taking of the flood waters of the Ware River in excess of 85 million gallons a day. The legislation expressly forbids the diversion of any water between May 31 and December 1 of any year without the approval of the Department of Public Health of the Commonwealth of Massachusetts (Mass. St. 1926, c. 375, §§ 1, 4; Reprint of Answer, pp. 37, 40, 84-85; Transcript, p. 134; Joint Sum. pp. 24, 25).

War Department Findings.

The War Department, in a communication approved by the Secretary of War on March 14, 1928, permitted the diversion of all flood waters on the Ware River in excess of 85 million gallons a day (131.5 cubic feet per second) between October 15 and June 15, but prohibited absolutely the taking of any water except during that period. It was further stated in that communication that the proposed diversion of the Ware River will "have no adverse effect on the navigable capacity of the Connecticut River" (Reprint of Answer, pp. 81-87; Transcript, p. 134; Joint Sum. pp. 24, 25).

Swift River.

Massachusetts Legislation.

By chapter 321 of the Acts of 1927 the Massachusetts Legislature authorized the diversion of the water of the Swift River in excess of the quantity required to maintain a flow at Bondsville (about 5 miles below the proposed Swift River Reservoir) of 20 million gallons a day (31 cubic

feet per second). (Mass. St. 1927, c. 321, § 1; Reprint of Answer, p. 52; Transcript, pp. 132, 135; Joint Sum. p. 25).

War Department Findings.

The War Department under date of May 17, 1929, made a finding (Reprint of Answer, pp. 92-100) under the terms of which the diversion authorized by the Massachusetts legislation is permitted, except that during the period from June 1 to November 30 (both inclusive) 110 cubic feet per second (71 million gallons a day) shall be released at the dam on the Swift River (Transcript, pp. 135-136) from the impounded waters (in the proposed Swift River Reservoir) whenever the flow of the Connecticut River at Sunderland, Massachusetts (a town where a stream flow gauge is maintained about 20 miles north of the confluence of the Chicopee and Connecticut Rivers), is 4650 cubic feet per second or less; and when the flow of the Connecticut River is more than 4650 and less than 4900 cubic feet per second 70 cubic feet per second (45 million gallons a day) shall be released (Transcript, pp. 135-136; Joint Sum. p. 25).

The Secretary of War found that no impairment of the navigable capacity of the Connecticut River will result from this diversion as modified by him, and furthermore that a discharge of 4900 cubic feet per second at Sunderland corresponds to an average lower low tide gauge height of 2.1 at Hartford and a discharge of 4650 cubic feet per second at Sunderland to an average lower low tide gauge height of 2.0 at Hartford (Reprint of Answer, pp. 89-102; Transcript, pp. 135-136; Joint Sum. p. 25).

Statistical Data.

The Special Master found (and there was no substantial disagreement on these points) that the following

statistics were accurate (Rep. Sp. M. 4-5; see also Agreement in Joint Sum. pp. 2, 3).

Annual flow, Connecticut River at Massachusetts-Connecticut boundary (equivalent approximately to 11,000 million gallons a day; see Transcript, pp. 137, 656)	17,000 cubic feet per second
Yield of diversion from the Ware and Swift Rivers as permitted by the Secretary of War (Transcript, p. 215) (equivalent to 296 cubic feet per second)	191 million gallons a day
Total watershed of Connecticut River (Transcript, p. 129)	11,300 sq. miles
Watershed lying above Massachusetts-Connecticut boundary (Transcript, p. 102)	9,915 sq. miles
Drainage area of Connecticut River watershed in Connecticut	1,385 sq. miles
Drainage area of Ware River at point of partial diversion of flood waters (Transcript, p. 131)	98 sq. miles
Drainage area of Swift River at point of partial diversion (Transcript, p. 131)	186 sq. miles

The Metropolitan Area consists of 20 cities and 15 towns which are eligible to become members; these 35 cities and towns have a population of about 1,900,000 (Rep. Sp. M. 2).

The total drainage area of Ware and Swift Rivers *subject to partial diversion* is 2.93% of the total watershed of the Connecticut River above Connecticut (Transcript, pp. 139-140). The diversion of water under the terms of the findings of the Secretary of War is only approximately 2% of the average annual flow of the Connecticut River at the Massachusetts-Connecticut boundary (Transcript,

pp. 1417-1418, 656; Joint Sum. p. 3). 94% of this diversion occurs when the Hartford gauge (a recording device at Hartford, Connecticut) shows 3½ feet (Transcrpt. p. 1419; Joint Sum. p. 26), which means 1½ feet above the 12-foot depth which the government contemplates as a future channel depth to be maintained below Hartford (Rep. Sp. M. 5).

The Pleadings.

The Connecticut Bill.

The State of Connecticut, alleging that the Massachusetts project would cause that State and its citizens serious injury, brought an original bill in equity before this Honorable Court, even before the War Department had acted upon the Massachusetts petitions for approval of the project. The bill in equity seeks to enjoin Massachusetts from carrying out the project adopted by the Legislature, as that project is set out in the bill.

Connecticut [appearing not only as a proprietor of riparian lands (Bill, p. 6) and as owner of the bed of the Connecticut River within the State of Connecticut (Bill, p. 6), but also as *parens patriae* (Bill, pp. 2, 6, 10, 13)], sets forth the Massachusetts project as involving a diversion of water not only from the Swift and Ware Rivers, but also from the Millers River (Bill, pp. 9, 10, 11). The alleged diversion from these three rivers is said to be only a portion of a general plan adopted by Massachusetts which is said to include also the acquisition of the waters of the Deerfield and Westfield Rivers (both tributaries of the Connecticut River) and of the Quaboag River, a tributary of the Chicopee River (Bill, p. 10; see also Bill, pp. 2, 3; p. 5).

Connecticut avers that the Massachusetts project, if carried into effect, will cause the State of Connecticut and

its inhabitants serious damage by obstructing navigation; by increasing the intensity of pollution in the Connecticut River as it enters the State of Connecticut, to the menace of the health of the people of that State; by diminishing the alleged beneficial effects of floods upon agriculture; and by causing general damage to the property in the Connecticut River Valley.

The Massachusetts Answer.

Massachusetts, in an answer to the bill filed by leave of court, denies that any injury to navigation, to the State of Connecticut, or to the citizens of that State, or to their health, welfare, or property, will result from the proposed diversion, and affirmatively alleges that, compared to the total flow of the Connecticut River at the Connecticut-Massachusetts boundary, the flow to be diverted is negligible and insignificant (Reprint of Answer, pp. 1-30). Massachusetts also denied that the water supply project involved any diversion whatsoever from the Millers River or from any river other than the Ware and Swift Rivers (Reprint of Answer, pp. 24-25, 26). Massachusetts also sets up certain affirmative legal and equitable defenses (Reprint of Answer, pp. 30-35), including—

(*a*) The existence of an emergency within Massachusetts constituting a justification for a reasonable use of the waters to be taken by the proposed diversion (Reprint of Answer, pp. 30-31).

(*b*) The existence of an adequate remedy at law in the State of Connecticut and its citizens in the form of compensation for any injury caused to the State or its citizens (Reprint of Answer, pp. 31-32, 34).

(*c*) The serious injury to the welfare of the citizens of Massachusetts if the diversion is prohibited, compared to the negligible and trivial damage to Connecticut and

its citizens possibly caused if the diversion is permitted, which should lead a court of equity to give substitutional relief rather than specific relief (Reprint of Answer, pp. 32, 34).

(*d*) The contention that the claim of Connecticut goes beyond a claim in behalf of the State in its true capacity as *parens patriae* (Reprint of Answer, p. 34).

(*e*) The contention that, so far as relief is sought for interference with navigation, the matter is one delegated under due constitutional authority by the Congress of the United States to the Secretary of War and his subordinates, and, by the decision of the Secretary, eliminated from further consideration (Reprint of Answer, pp. 33-34, 81-102).

(*f*) The contention that the diversion is one which is "*de minimis*" and in all respects a reasonable use of the waters of the Swift and Ware Rivers by Massachusetts (Reprint of Answer, pp. 13, 14, 15, 17, 18, 21, 22, 23, 25, 26, 27, 30, 33, 35).

(*g*) Laches (Reprint of Answer, pp. 31, 34).

(*h*) The benefit to Connecticut and lower riparian owners from the stabilization of stream flow through the storage of waters in wet seasons and the release of some of such stored water in dry seasons (Reprint of Answer, pp. 14, 15, 22).

The Amendments to the Answer.

The action of the War Department did not take place until after the filing, in March, 1928, of the original answer in these equity proceedings. The answer as amended contains the pertinent portions of the applications to the War Department and of the decisions of that Department (Reprint of Answer, pp. 81-102). The amendments were allowed December 2, 1929.

Connecticut's Reply.

After the denial of a motion to dismiss the defendant's answer and the denial of a motion to strike out certain portions of that answer, Connecticut filed a reply which—

1. Denied the affirmative allegations of fact in the defendant's answer.

2. Averred that there was no necessity for Massachusetts to make use of the waters of the Ware and Swift Rivers in order to supply the Metropolitan District about Boston with drinking water because of the alleged existence of an adequate supply of drinking water in Eastern Massachusetts.

The Special Master's Report.

The report of the Special Master filed by him, after hearing the evidence offered by the parties and argument, recommends that the bill of complaint be dismissed.

Preliminary Questions of Law.

After making general findings of fact (Rep. Sp. M. 2-6), which have been discussed above, the Special Master stated the general principles of law upon which he rested his conclusions:

1. In a suit brought by one State against another, before this Honorable Court will act it must be shown by unusually clear and convincing evidence that the threatened invasion of right is of serious magnitude [citing *Missouri* v. *Illinois*, 200 U.S. 496, 521; *New York* v. *New Jersey*, 256 U.S. 296, 309; *North Dakota* v. *Minnesota*, 263 U.S. 365, 374. Rep. Sp. M. 6-7]. An injunction will not be granted where there is an adequate remedy at law.

2. The cardinal rule as between States claiming rights in interstate rivers is "equality of right" in the use of the waters involved. This Court in determining the applica-

tion of the principle to be made in any case is not limited to the principles of the common law (even if both States in their local municipal law recognize the principles of the common law). It may and usually does administer international law in the exercise of its original jurisdiction [citing *Kansas* v. *Colorado*, 206 U.S. 46, 97-100; *Wyoming* v. *Colorado*, 259 U.S. 419, 464-465], adopting in each case the rule best suited to the particular situation (Rep. Sp. M. 7-9).

3. There is no rigid principle either of the common law or of international law which prohibits the diversion of water from one watershed to another, provided the diversion is otherwise reasonable and consistent with the doctrine of "equality of right" (Rep. Sp. M. 10-12).

4. Congress, by § 10 of the Act of March 3, 1899, has delegated to the Secretary of War the power to license such diversions of water from the tributaries of navigable streams as he may find as a matter of fact do not unreasonably or materially interfere with navigation (Rep. Sp. M. 12-17).

Findings of Fact as to Alleged Damage to Connecticut.

The Special Master made specific findings of fact as to each class of damage alleged by Connecticut:

1. *Navigation* (Rep. Sp. M. 18-19). The Special Master finds as a fact that the "proposed diversions will not interfere perceptibly or materially with the navigation of the Connecticut [River]," inasmuch as it is only at times of high water that a substantial diversion will take place; the flow at low stages of the river being increased in accordance with the findings of the War Department.

2. *Agriculture and Inundated Land.* The Special Master finds (Rep. Sp. M. 20) that the alleged "damage to the hay land is not shown to be of 'serious magnitude'; and . . . far from being 'established by clear and con-

vincing evidence', is shown by no evidence making it possible of computation or proving that it is large." On the other hand the Special Master finds that any diminution in the height of the spring floods (although the floods are alleged by Connecticut to be beneficial to the hay crop) will reduce other damage caused by the floods (Rep. Sp. M. 19-20).

3. *Power Project.* The Special Master found that no damage would be caused by the proposed diversion to Connecticut power except to one possible power development at King's Island in Connecticut near the state line. The company which owns this potential power, the Special Master finds, has been authorized by the Federal Power Commission to build a higher dam to develop 50,000 horse power instead of the present development of 4000 horsepower. The work, however, has not been done, as the required capital has not been subscribed or arranged for (Rep. Sp. M. 20-21). The Special Master therefore recommends that, if these facts bring the potential King's Island power within the cases of *New York* v. *Illinois*, 274 U.S. 488, and *New Jersey* v. *Sargent*, 269 U.S. 328, 338-339, an injunction should be denied, because no present use of the water for power would be disturbed. Assuming that the cases cited do not apply, the Special Master finds that, by giving Massachusetts credit for water added to the Connecticut River in times of low flow, in accordance with the Secretary of War's requirements, $80,000 paid in money by Massachusetts to the power company, or its assigns, would be an adequate compensation for the injury to this possible power development to be caused by the proposed diversion.

4. *Shad and Other Fish Life.* The Special Master finds that the evidence introduced on this point does not indicate that the lowering of flood waters, possibly resulting from the proposed diversion, will in any way be materially injurious to the shad run (Rep. Sp. M. 22-23).

5. *Alleged Increased Pollution Due to Proposed Diversion.* The Special Master finds that the Connecticut River has been treated with an utter disregard to its purity both by Massachusetts and Connecticut. He points out, however, that the present case is not a bill brought to abate the existing pollution of the river, and that in such a bill Connecticut would not come into court with clean hands [citing *Missouri* v. *Illinois*, 200 U.S. 496, 518-520]. Upon evidence introduced by the Connecticut witnesses themselves, which the Special Master quotes at length (Rep. Sp. M. 24-28), to the effect that the "diminution in flow resulting from the proposed diversions would have no perceptible effect upon pollution" (Rep. Sp. M. 28), he finds that the plaintiff has failed to prove that any material pollution damage to Connecticut will result from installing and operating the proposed Ware and Swift works (Rep. Sp. M. 28).

Findings of Fact as to Whether Boston Ought to be Compelled to Take Its Domestic Water Supply from Northeastern Massachusetts.

The Special Master, with respect to the issues raised by the Connecticut Reply as to whether or not there existed in Eastern Massachusetts a suitable and adequate supply of drinking water for the Metropolitan District about Boston, found generally that there were certain sources in Eastern Massachusetts from which Boston might make available a considerable amount of water, but that most of the water (including the Merrimack River, Rep. Sp. M. 52) in Eastern Massachusetts, not already used, is of a quality much inferior to that of the Ware River and the Swift River, that any project for using such water would be inferior, from an engineering standpoint, to the Ware-Swift development, that whatever inferior water might be realized from the Eastern Massachusetts sources outside

of the polluted Merrimack River would be inadequate in quantity (Rep. Sp. M. 39), filling only a part of the requirements, and that all the eastern waters (including the Merrimack River) would constitute a supply largely of uncertain duration which in whole or in part might have to be thrown away in the future (Rep. Sp. M. 39 and 51-52). Referring to the three reports (Exhibits C-1, C-2, C-3) and to the Acts 1926, c. 375, and Acts 1927, c. 321, the Special Master also stated as follows: "I think these investigations and the legislative acts show a public sentiment against the eastern water supplies and make a *prima facie* case that these supplies are inadvisable, either because inadequate or unfit" (Rep. Sp. M. 30).

The Connecticut Exceptions.

The complainant, the State of Connecticut, has taken seventy-five exceptions to the findings and rulings of the Special Master. They may be roughly grouped as follows:

I. Exceptions to Findings as to Scope and Nature of Massachusetts Project.

A. Exceptions as to Findings of Fact.

1. As to the character and extent of the proposed diversion with reference to the flow of the Ware and Swift Rivers (Exc. No. 1, p. 4). [This exception is based wholly upon the complainant's objection to characterizing the diversion of Ware River waters as a diversion of "flood" waters. The objection is one solely of nomenclature. The Special Master adopted the *description* of the diversion contained in Mass. St. 1926, c. 375, § 1 (Reprint of Answer, p. 2). His analysis of the *effect* of the diversion was based upon the quantity of water actually to be diverted from the Ware River under the War Department find-

ings. What the diversion is called is of no importance, as long as its character and extent clearly appear. The exception is without merit.]

2. As to the proportion of the average flow of the Connecticut River (Exc. No. 2, p. 5).

3. As to the effect of the proposed diversion on the height of the Connecticut River in Connecticut (Exc. Nos. 3, 4, pp. 5-7).

4. As to the possibility of a new project involving in the future a further diversion of waters by Massachusetts (Exc. Nos. 5, 6, pp. 7-8).

5. As to the intention of Massachusetts to comply with the terms and conditions of the finding of the Secretary of War (Exc. Nos. 6, 7, pp. 8-10).

B. Exceptions as to Rulings of Law.

1. As to the form of decree recommended (Exc. Nos. 8, 9, 23, pp. 10, 13).

2. As to the law applicable to a controversy between two *quasi*-sovereign states in a dispute involving an interstate and international stream (Exc. Nos. 9, 10, 11, 12, 13, 14, 15, 16, 21, 22, pp. 10-13).

3. As to the construction adopted by the Special Master of the Massachusetts statutes authorizing the Ware–Swift project (Exc. Nos. 16, 20, pp. 12, 13).

4. As to the materiality of evidence as to a conjectural future diversion (Exc. No. 19, p. 12).

II. Exceptions to Findings as to Navigation.

A. Exceptions to Findings of Fact.

1. As to the effect of diversion on navigation (Exc. No. 24, pp. 13-14).

2. As to the negotiations between Massachusetts and the War Department (Exc. No. 25, pp. 14-15).

B. Exceptions as to the Law.

1. As to the power of the Secretary of War and of Congress (Exc. Nos. 26, 27, 28, 38, pp. 15-17).

2. As to the applicability of §§ 9 and 10 of the Act of March 3, 1899 [30 STAT. AT L. 1151, U.S. Code, Tit. 33, §§ 401, 403], to the details of the actual structures which Massachusetts proposes to erect in the valleys of the non-navigable Swift and Ware Rivers and to those streams (Exc. Nos. 29, 30, 31, 35, pp. 15-17).

3. As to the scope of the powers of the Secretary of War under §§ 9 and 10 of the 1899 Act with respect to the approval of projects for the diversion of water from non-navigable tributaries of navigable streams, on the ground that such diversions will not in fact unreasonably or materially affect navigation or commerce (Exc. Nos. 32, 33, 34, 36, 37, 75, pp. 16-17, 34; see also Exc. No. 18, p. 12).

III. Exceptions to Findings as to Effect of the Massachusetts Project on Connecticut Interests Other Than Navigation.

A. Power. (See Rep. Sp. M. 20-21.)

1. Exceptions to the findings of fact that the damage to the capitalized value of the undeveloped power which would be affected by the Massachusetts project amounted only to $80,000 (Exc. Nos. 39, 40, 41, pp. 17-19).

2. Exceptions to the Special Master's mixed ruling of law and fact that the payment of money damages at law by Massachusetts to the Connecticut owners of the potential power when and if they develop it, would adequately compensate Connecticut for the injury to be caused by the proposed diversion; and that no injunction should issue (Exc. Nos. 42, 43, 44, 45, 46, pp. 19-20).

B. Agriculture.

1. Exceptions to the finding of fact that the extent of the damage to agriculture and the benefit to flooded riparian lands caused by a diminution in the height of the spring floods by the proposed diversion would not be measurable or material, and certainly not of serious magnitude (Exc. Nos. 47, 48, 49, 50, pp. 20-23).

2. Exceptions to the rulings of law by the Special Master that the alleged damage to agriculture proved by Connecticut (taken in connection with all other damage shown as likely to be caused by the execution of the Massachusetts project) is not sufficient to warrant enjoining one *quasi*-sovereign state at the suit of another (Exc. Nos. 51, 52, 53, p. 23).

C. Pollution of the Connecticut River.

1. *Exceptions to Findings of Fact*—

(*a*) as to the present state of the Connecticut River and as to the immaterial effect of the Massachusetts project upon the pollution content of the river (Exc. No. 54, p. 24).

(*b*) as to the practice of the State of Connecticut and of the Commonwealth of Massachusetts with respect to the use of the streams in those States for drainage and sewage disposal (Exc. No. 55, p. 24).

2. *Exception to Special Master's Ruling of Law* that in this case the present pollution of the Connecticut River is immaterial, inasmuch as Connecticut has not shown that the Ware–Swift project, if carried into execution, will of itself cause any material damage to the State of Connecticut (Exc. No. 56, p. 26).

D. Fish Life.

Exception to the finding of fact that the Massachusetts project would not injure the shad or other fish life in the Connecticut River (Exc. No. 57, p. 26).

IV. Exceptions to Findings as to Objections to Supplies of Water in Eastern Massachusetts Alleged by Connecticut to Exist.

A. Exceptions to Findings of Fact.

1. As to the water supply of Lawrence, Massachusetts, and the extraordinarily large use of bottled water in that city because of the popular distaste and dread of the polluted waters of the Merrimack River (Exc. No. 58, pp. 27-28).

2. That the Merrimack River is "a legalized public sewer," and that there is "no certainty that it will not become more polluted" (Exc. No. 59, p. 28).

3. To the failure to find that Boston could be supplied with water even if the Ware and Swift supplies could not be obtained (Exc. No. 66, p. 31).

4. To the failure to find that Boston's present supply needs chlorination (Exc. No. 60, p. 28).

B. Exceptions to the Conclusions of Mixed Law and Fact.

1. That, inasmuch as Connecticut has shown no injury of great magnitude and no injury for which the damages at law are not adequate, Boston should not be compelled to resort to Eastern Massachusetts waters which are grossly inferior to and greatly more hazardous than the Ware-Swift supply; particularly as Connecticut has not proved that adequate, safe, and suitable supplies of water are available in Eastern Massachusetts to meet the needs of that section of the State above and beyond the supplies which Massachusetts has shown to be available (Exc. Nos. 61, 62, 63, 64, 65, 67, pp. 28-33).

2. Which are said to be based upon consideration by the Special Master of elements to which it is averred he should not have paid any attention or upon his failure to consider matters which it is said by Connecticut were of importance (Exc. Nos. 68, 69, 70, 71, 72, 73, 74, 75, pp. 33-34).

SUMMARY OF ARGUMENT.

I. The Special Master correctly found that Connecticut has not proved that that complainant State or its citizens will suffer any appreciable or substantial damage as the result of the execution of the Massachusetts project. He properly recommended that no injunction should be granted in the absence of such proof. (See *infra*, p. 25.)

A. In order to be entitled to relief by injunction, Connecticut in this suit in equity against another *quasi*-sovereign State must prove damage of serious magnitude to her sovereign rights or to interests which she represents as *parens patriae*. (See *infra*, p. 25.)

B. The complainant State in a suit such as the case at bar must show present or presently threatened damage to existing interests. (See *infra*, p. 27.)

C. The Massachusetts project is contained in the Massachusetts legislation as modified by the War Department findings. It involves no diversion of waters from rivers other than the Ware and the Swift. Massachusetts must obey the War Department findings while they remain in force. (See *infra*, p. 30.)

D. The findings of the Special Master, not only warranted, but compelled by the weight of the evidence, show that the Ware–Swift project will cause no material injury to present Connecticut interests. Any injury suffered is *de minimis*. (See *infra*, p. 41.)

1. There is no proof of injury to existing interests of navigation. (See *infra*, p. 41.)

2. There will be no injury to Connecticut because of increased pollution of the Connecticut River if the Massachusetts project is carried out. (See *infra*, p. 52.)

3. Agriculture in Connecticut will not be damaged in measurable degree by the Massachusetts project. (See *infra*, p. 57.)

4. No existing Connecticut power plant will be affected by the Massachusetts project. Complete compensation for any injury to potential future developments can be made by the payment of money damages. (See *infra*, p. 63.)

5. Fish life in the Connecticut River will not be affected by the Massachusetts project. (See *infra*, p. 71.)

II. The action of the Secretary of War and the Chief of Engineers upon the applications for the approval of the contemplated diversions constituted a proper performance of the duties delegated to them by the Act of Congress of March 3, 1899. That action, by deciding that the diversion is not objectionable (within the limits specified in the War Department findings), so far as *navigation* is concerned, forecloses any contention of Connecticut that the diversion will injure navigation. (See *infra*, p. 74.)

III. The Special Master was correct in ruling that the principle of "equality of right" controlled the use of the Connecticut River by the States through which it flows. Massachusetts is entitled to make a reasonable use of the waters of the Connecticut River, including the right to appropriate permanently an equitable portion of its waters. (See *infra*, p. 98.)

A. The law applicable to the case at bar is to be determined by this Honorable Court in the light of the whole situation of fact; having due regard to the decisions of this Court in other interstate cases, to the municipal law in force in Massachusetts and Connecticut, to pertinent provisions of international law and practices, and to the customary methods of obtaining and using water in the two States here involved. No one of these factors is all-important. (See *infra*, p. 99.)

B. The decisions of this Court establish the principle of the equitable division of the benefits arising from an interstate river among the States through which the river

passes. This doctrine referred to by the Special Master as the rule of "Equality of Right" would be applicable to the case at bar, provided that Connecticut had proved damage or injury of serious magnitude. (See *infra*, p. 106.)

C. International law establishes the principle of equitable division of the benefits of interstate waters as between the sovereigns through whose lands the waters pass. In making an equitable division of beneficial use, due weight must be given to the comparative benefit to be derived by each sovereign from each particular use. The fundamental and most important use of water is for quenching thirst and for other domestic purposes. (See *infra*, p. 114.)

D. Under the municipal law both of Connecticut and of Massachusetts, so far as it furnishes an analogy of weight in this case, the Massachusetts project would be deemed reasonable. (See *infra*, p. 121.)

1. Under the riparian law in force both in Massachusetts and in Connecticut a riparian owner is entitled to make a reasonable use of the waters flowing past his land, having due regard for the interests of upper and lower riparian owners upon the same stream. (See *infra*, p. 121.)

2. Connecticut habitually permits diversions of streams to other watersheds for the purpose of supplying municipalities with water for domestic use. Connecticut in equity cannot complain if Massachusetts makes reasonable use of interstate waters arising within her borders for similar purposes, even if a diversion be necessary; provided Massachusetts does not permanently abstract more than the share of such interstate waters to which she is entitled under the doctrine of equal division of benefit. (See *infra*, p. 127.)

E. The Special Master was correct in finding that the Metropolitan District about Boston ought not to be com-

pelled to resort to inferior, polluted, and inadequate waters said by Connecticut to be available in Eastern Massachusetts. (See *infra*, p. 134.)

1. The contention of Connecticut that Massachusetts has available supplies of water elsewhere than in the Ware and Swift Rivers is immaterial, unless this Court reverses the findings of fact of the Special Master and decides that Connecticut has shown substantial damage resulting from some act of Massachusetts. In that event the evidence upon the existence of other water sources may be material as bearing upon the issue of whether this Honorable Court in Equity ought to grant any specific or injunctive relief. (See *infra*, p. 134.)

2. Massachusetts has established, as the Special Master has found, that there are not adequate supplies of pure water in Eastern Massachusetts to meet the demands of the population of that region in the future and that it is necessary to obtain the Ware Swift supply chosen by the Massachusetts Legislature after due deliberation. Connecticut has not shown that the Special Master was incorrect in his conclusion that Boston ought not to be forced to adopt the inadequate schemes suggested by Connecticut for supplying the city with hazardous, treated water from inadequate and polluted Eastern Massachusetts sources. (See *infra*, p. 136.)

POINTS AND AUTHORITIES.

I. THE SPECIAL MASTER CORRECTLY FOUND THAT CONNECTICUT HAS NOT PROVED THAT THAT STATE OR ITS CITIZENS WILL SUFFER ANY APPRECIABLE OR SUBSTANTIAL DAMAGE AS THE RESULT OF THE EXECUTION OF THE MASSACHUSETTS PROJECT. HE PROPERLY RECOMMENDED THAT NO INJUNCTION SHOULD BE GRANTED IN THE ABSENCE OF SUCH PROOF.

A. In Order to be Entitled to Relief by Injunction, Connecticut in This Suit in Equity against Another Quasi-Sovereign State must Prove Damage of Serious Magnitude to Her Sovereign Rights or to Interests which She Represents as Parens Patriae.

One doctrine stands out more clearly than any other established by this Honorable Court in its exercise of original jurisdiction over justiciable controversies between the *quasi*-sovereign States of the Union. That doctrine is emphatically expressed in the following language of the Court, and we submit it is applicable to the case at bar:

> "Before this court can be moved to exercise its extraordinary power under the Constitution to control the conduct of one State at the suit of another, the threatened invasion of rights must be of serious magnitude and it must be established by clear and convincing evidence."
>
> Mr. Justice *Clarke*, in *New York* v. *New Jersey*, 256 U.S. 296, 309.

> "Before this court ought to intervene the case should be of serious magnitude, clearly and fully proved, and the principle to be applied should be one

which the court is prepared deliberately to maintain against all considerations on the other side."

Mr. Justice *Holmes*, in *Missouri* v. *Illinois*, 200 U.S. 496, 521.

"In such action by one State against another, the burden on the complainant State of sustaining the allegations of its complaint is much greater than that imposed upon a complainant in an ordinary suit between private parties."

Chief Justice *Taft*, in *North Dakota* v. *Minnesota*, 263 U.S. 365, 374.

The statements just quoted were all made in controversies between *quasi* sovereign States in which the complainant State was seeking equitable relief against an alleged injury to its sovereign right threatened by the defendant State. The doctrine established by these decisions—the doctrine that substantial injury of great magnitude must be shown by unusually clear and convincing proof—has not been questioned in the decisions of this Honorable Court. It is the fundamental doctrine upon which interstate equity suits before this Court are decided. The authorities just cited, therefore, in large measure dispose of Connecticut exceptions numbered 9, 51, 52, 53, 54, 56, pp. 10, 23, 24, 26, in view of the findings of fact by the Special Master to the effect (see *e.g.* Rep. Sp. M. 28) that "Connecticut has failed to show any important and very considerable" present damage as the result of the Massachusetts project.

Massachusetts contends, therefore, that in this case Connecticut must show by clear and incontrovertible proof, far beyond that required of an individual in a suit between private parties—

(1) not only that some sovereign or property right of that State itself or right which the State is bound to protect as *parens patriae* is threatened by Massachusetts; but also (2) that the Massachusetts project, if not enjoined, will cause injury of great magnitude to Connecticut.

It is submitted that, if this Court adopts as correct the Special Master's finding to the effect that no such damage has been shown by Connecticut, further consideration of the case is unnecessary, and that Connecticut's failure on this point is fatal to its case.

We shall contend below [*infra*, Argument heading II, especially subsection B2] that, in view of the plenary powers given to the Congress by the Constitution with respect to the regulation of interstate and foreign commerce and in view of the delegation by the Congress to the Secretary of War of many of those powers (so far as navigable waters are concerned), Connecticut has no standing as *parens patriae* to protect any interest of navigation.

See *Southern Pacific Co.* v. *Olympian Dredging Co.*, 260 U.S. 205, 207-208.
United States v. *Chandler-Dunbar Co.*, 229 U.S. 53, 62-63.
Monongahela Bridge Co. v. *United States*, 216 U.S. 177, 195.

Compare:
Florida v. *Mellon*, 273 U.S. 12, 18.
Massachusetts v. *Mellon*, 262 U.S. 447, 485-486.

B. The Complainant State in a Suit such as the Case at Bar Must Show Present or Presently Threatened Damage to Existing Interests.

A second doctrine limiting relief sought by one State against another is [the principle] that a complainant

State, in order to obtain equitable relief against a sister sovereign State, must show that some presently existing interest is affected by the action, or presently threatened action, of the defendant State.

In *New York* v. *Illinois*, 274 U.S. 488, New York was seeking to enjoin the Sanitary District of Chicago "from continuing a very substantial diversion of water from Lake Michigan." One paragraph of the bill in equity proceeded on the theory that the diversion sought to be enjoined would interfere with the use of the waters of the Niagara River by the complainant State and her citizens for the development of power. This Court, upon motion of the defendant, struck from the bill this paragraph, and, through Mr. Justice *Van Devanter*, spoke as follows of the allegations contained in the paragraph (at pp. 489-490):

> "But it does not show that there is any present use of the waters for such purposes which is being or will be disturbed; nor that there is any definite project for so using them which is being or will be affected. . . . The suit is one for an injunction, a form of relief which must rest on *an actual or presently threatened* interference with the rights of another. Plainly no basis for such relief is disclosed in what is said about water power development. At best the paragraph does no more than present abstract questions respecting the right of the plaintiff State and her citizens to use the water for such purposes in the indefinite future." (Italics ours.)

To the same effect is that portion of the decision in *New Jersey* v. *Sargent*, 269 U.S. 328, found at pages 338-340. Compare *Florida* v. *Mellon*, 273 U.S. 12, 18.

The Special Master in the case at bar recommended the application of this doctrine to the Connecticut contention that a single potential water power, as yet entirely unde-

veloped, if it were developed at some future time, could generate slightly less current each year, if the Massachusetts water-supply project (as modified by the War Department findings) were carried out (see Rep. Sp. M. 20-21). The Special Master also (Rep. Sp. M. 52-53) recommended that the doctrine be applied to the Connecticut contention that at some future time Massachusetts would endeavor to take additional waters from the valley of the Connecticut River in order at that time to supply Northeastern Massachusetts with pure drinking water. The Special Master, although he did not exclude any evidence offered in support of any contention, disregarded this evidence in his report as immaterial.

The evidence offered by Connecticut on this point shows clearly how sensible is the rule that this Court has adopted refusing to consider (in suits between States under its original jurisdiction) evidence which at most shows that the complainant State may perhaps be subjected to some injury at an unascertainable date in the distant future. Connecticut endeavored to prove by extracts from reports of various Massachusetts legislative committees in 1895, 1922, and 1926 [some of which reports were not adopted] that the present Massachusetts project was something more than the project actually contained in the Massachusetts legislation [see Reprint of Answer, pp. 36-80] as modified by the War Department findings [see Reprint of Answer, 81-102]. Connecticut also introduced evidence in an attempt to prove that the size of the actual construction, planned or being built by Massachusetts, is excessive for the present Massachusetts project, and indicates that at some future date, possibly after 1970, the Massachusetts Legislature is going to enact statutes authorizing a further diversion by means of these works [see Joint Sum. p. 11 *et seq.*; Transcript, pp. 89, 197, 198, 207, 211, 248, 357, 686, 691, 697, 713, 1865, 2172]. Such indefinite evidence of unaccepted or rejected recommendations of legislative

committees and of conjectures as to the distant future by engineers hazarding a guess as to the needs of two generations hence is hardly the type of proof upon which this Court has been accustomed to enjoin a *quasi*-sovereign State of the union from carrying out a present project which is carefully confined to a narrow compass by statute and by two valid findings of the Secretary of War. The contentions of Connecticut in exceptions 5, 6, and 19 are, it is submitted, without merit (see Conn. Exc. pp. 7-8, 12).

C. The Massachusetts Project is Contained in the Massachusetts Legislation as Modified by the War Department Findings. It Involves No Diversion of Waters from Rivers Other than the Ware and the Swift. Massachusetts Must Obey the War Department Findings while They Remain in Force.

1. The Statutes Themselves Authorize No Diversion from any Rivers but the Ware River and the Swift River.

The Special Master (Rep. Sp. M. 53) found that the "Massachusetts legislation confines itself to taking certain waters from the Ware and Swift" (see also Rep. Sp. M. 3). This finding is clearly right. [It is excepted to by Connecticut, see Conn. Exc. No. 19, p. 12.] The Massachusetts legislation is contained in Mass. St. 1926, c. 375, and Mass. St. 1927, c. 321 (Reprint of Answer, pp. 36-80). This legislation has been briefly summarized above, but certain provisions with respect to the waters to be included in the diversions are here pertinent.

Ware River Act.

Mass. St. 1926, c. 375, created a special Metropolitan District Water Supply Commission of three members (§ 1, Reprint of Answer, p. 36). This Commission is authorized, for the purpose of extending and increasing the water

supply of the Metropolitan water system, to divert into the Wachusett Reservoir (the principal reservoir now supplying Boston) flood waters of the Ware River (defined in § 4, Reprint of Answer, pp. 40-41, as "the waters . . . at and above the point of diversion . . . in excess of a flow of 85 million gallons a day, meaning thereby that on any day when the actual flow of said river is less than 85 million gallons no water shall be diverted") at a point near the village of Coldbrook.

The Commission is directed to construct the works necessary for this diversion at such grade and of such capacity that they can be used as a part of works later to be constructed for diverting into the Wachusett Reservoir the waters of the Swift River in substantial accordance with the plans and recommendations contained in House Document (1922) No. 1550 (Exhibit C-1).

By section 5 (Reprint of Answer, pp. 41-43) the Commission is authorized to acquire the water rights and property on the Ware River necessary for the diversion and for the protection of the purity of the water of the river, either by purchase or by a taking in accordance with the provisions of the eminent domain laws of the Commonwealth (General Laws, 1921, c. 79, as amended). It is expressly provided that "the owner of any real estate, whether *within or without* the commonwealth, which is not taken, but is injured by the taking of the waters of Ware River under authority of this act, or by the construction of the works incidental thereto, shall be entitled to damages therefor, and may recover the same from the Commonwealth, as in the case of a taking in accordance with the provisions of this act." (Italics ours.)

Swift River Act.

By St. 1927, c. 321, the Metropolitan District Water Supply Commission, established by the 1926 act, is author-

ized to extend the water supply of the Metropolitan water system by diverting into the Wachusett Reservoir the waters of the Swift River and Beaver Brook (a tributary of the Ware River). This diversion is to be accomplished by extending the tunnel between the Wachusett Reservoir and the Ware River to the Swift River, by the construction of a temporary dam just below the confluence of the East and Middle branches of that river near the village of Greenwich, and ultimately by the construction of a dam across the Swift River near the boundary line between the towns of Ware and Enfield, and also by a dam across Beaver Brook near this boundary line, thereby creating a storage reservoir in the Swift River Valley.

Section 1 (Reprint of Answer, pp. 51-53) definitely provides that "no water shall be diverted or stored in any calendar day when the flow of the Swift river at or just above the village of Bondsville . . . is less than twenty million gallons [a day], and there shall be discharged from any storage created by the commission above said village a sufficient amount of water to maintain, so far as such storage will allow, a flow of said river at said village of not less than twenty million gallons in each calendar day."

By section 2 the Commission is authorized to construct as a part of the Metropolitan water system such works as may be necessary, and it is further provided that "the works authorized by this act shall be of such dimensions, capacities, and areas as the commission may determine; and may from time to time be enlarged or modified as the commission may determine, and may be so constructed, enlarged or modified as to allow for a future increase in capacity to take care of the diversion of other streams in substantial accordance with the plans and recommendations of the joint board on water supply needs and resources of the commonwealth as contained in its report to the general court in nineteen hundred and twenty-two printed as house document fifteen hundred and fifty of

that year; *but nothing in this act shall be held to authorize any taking or diversion of any waters of the Millers river water shed or to affirm the intention of taking at any future date any unutilized flood waters of said Millers river*" (Reprint of Answer, pp. 53-54; italics ours).

Section 4 gives the Commission the right, for the purposes of the act, to take by eminent domain, or to acquire by purchase, such lands, water, water rights, easements, and other property or interests in property as it may deem necessary or desirable; provided, however, that the amount of water to be let down into the Swift River as provided in section 1 of the act shall not be diminished.

Section 4, taken together with section 2 (Reprint of Answer, p. 54), has been construed by the Metropolitan District Water Supply Commission, and its Chief Engineer, as authorizing no taking of any waters from the Millers River (see Transcript, pp. 93, 402-404; see p. 494).

It is provided that takings under the act may be in fee or otherwise (Reprint of Answer, p. 56), and that they shall conform to the provisions of chapter 79 of the General Laws of Massachusetts, with the exception, *inter alia*, that "for all rights of diversion taken under this act appurtenant to *land not taken* the right to damages shall vest upon and not before the actual diversion of water." (Italics ours.) At any time the Commission is authorized to "make such settlements as it may deem for the best interest of the commonwealth with *any* person or corporation who may be or has been damaged by any . . . injury to his water rights under this act." (Italics ours.) It is further authorized to construct and furnish a compensatory flow in lieu of damages, if such arrangements can be made by contract.

Section 7 (Reprint of Answer, p. 62) gives the Commission, either before or after a taking, power to make

such settlements as it may deem for the best interest of the Commonwealth.

A detailed discussion of the remedies provided by these acts and the common law of Massachusetts to any person whose land or property is damaged by these diversions will be found later in this brief under the heading "An Adequate Remedy at Law" (*infra*, p. 65).

It would seem clear that the two acts, just summarized and quoted in part, *affirmatively authorized* diversions only from the Swift River and the Ware River. The 1927 Act specifically forbids any taking of water from the Millers River, which is the only river as a matter of geography sufficiently close to the present project readily to permit diversion thereto. An examination of the map found at the end of the Special Master's Report will show that this is true. Obviously the Legislature, in forbidding the Metropolitan District Water Supply Commission to make any diversion from the Millers River, felt that it had foreclosed the possibility of any diversion from rivers other than the Swift and the Ware by virtue of either the 1926 or 1927 legislation.

The Legislative Reports.

That no diversions from rivers other than the Swift River and the Ware River were contemplated by either the 1926 or 1927 Act becomes exceedingly clear when the legislative history of the two acts is taken into consideration. It is submitted that the legislation is not ambiguous, and that on its face it is clear that only some of the waters of the Swift and the Ware Rivers are included within the Massachusetts project. If, however, this Court should deem the Act to be ambiguous, resort may be had to legislative history in order to clear up the ambiguity and to show that the construction of the statute is that for which Massachusetts contends and which the Special Master has

found. *Duplex Co.* v. *Deering*, 254 U.S. 443, 474-475; *Wisconsin Railroad Commission* v. *C., B & Q. Railroad Company*, 257 U.S. 563, 589; compare *Everard's Breweries* v. *Day*, 265 U.S. 545, 561; *United States* v. *Missouri Pacific Railway*, 278 U.S. 269, 278; *Richbourg Motor Company* v. *United States*, 281 U.S. 528, 536.

Three legislative reports (see Joint Sum. p. 4) were presented in evidence before the Special Master by Connecticut, apparently for the purpose of showing that Massachusetts contemplates further diversions from the Connecticut River or its tributaries in addition to those authorized by the present legislation from the Ware and Swift Rivers.

The 1895 Report.

The first of these was House Document (1895) No. 500, Report of the Massachusetts State Board of Health (Exhibit C-3, Transcript, pp. 81, 228, 1588, 2171). It was as the result of this report that the present supply of Boston, the Wachusett Reservoir on the Nashua River, was adopted (Transcript, p. 1589; Joint Sum. p. 218). From this report (Transcript, p. 228) an attempt was made to show a general plan of diversion of a large number of tributaries of the Connecticut River, and the following paragraph of the report (p. XVI) was pointed out as a statement of this plan (Transcript, pp. 228-229):

> "The very great merit of the plan now submitted is to be found in the fact that this extension of the chain of the metropolitan water supplies to the valley of the Nashua will settle forever the future water policy of the district, for a comparatively inexpensive conduit can be constructed through to the valley of the Ware River, and beyond the Ware River lies the valley of the Swift; and, *in a future so far distant that we*

> *do not venture to give a date to it*, are portions of the Westfield and Deerfield rivers, capable, when united, of furnishing a supply of the best water for a municipality larger than any now found in the world." (Italics ours.)

Two answers to the Connecticut suggestion that here is a Massachusetts plan which threatens the complainant's welfare, may be made: The first is that the 1895 report is precisely what one Massachusetts witness (Dr. Winsor, Transcript, p. 79) called it—"ancient history." It can hardly be said that the suggestion of future policy by the members of a commission of a generation ago is the present action of a sovereign State, particularly when only the first of a series of projects outlined by that commission was actually adopted by the Legislature to which it reported (Transcript, pp. 229, 230). The second obvious reason for refusing to regard the 1895 report as a serious threat of Eastern Massachusetts diversion of the Westfield and Deerfield Rivers is the fact that the report itself refers to any such project as belonging "in a future so far distant that we do not venture to give a date to it."

House Document (1922) No. 1550.

A second report introduced by Connecticut was Massachusetts House Document (1922) No. 1550 (Exhibit C-1, Transcript, p. 33), Report of Joint Board on Water Supply Needs and Resources. This report, embodying the recommendations of the Massachusetts State Department of Health and the Metropolitan District Commission, sitting as a joint board, as to the appropriate method of extension of the Metropolitan District water supply, in general was the basis of the 1926 and 1927 acts. Briefly, this report recommended extending a tunnel westerly from the Wachusett Reservoir to the Ware River near Coldbrook

(Transcript, p. 86); thence further west to the valley of the Swift River, where a reservoir was to be built in which to store the freshet flows of three streams, the Swift, the Ware, and the Millers Rivers (see Exhibit C-1, pp. 18-21). This report, although it referred casually and briefly to the suggestion in the 1895 report (Exhibit C-3) that extensions might be made at some distant future date to the Deerfield and the Westfield Rivers, definitely advised abandonment of all consideration of the Westfield River as a potential water supply source for Eastern Massachusetts, on the ground that its waters were needed as a supply for Western Massachusetts cities and towns now growing rapidly (Exhibit C-1, p. 22). The 1926 and 1927 Massachusetts legislation (St. 1926, c. 375; St. 1927, c. 321; Reprint of Answer, pp. 37-80) adopted to a great extent the recommendations of the 1922 report and referred to the report as a general guide for the Construction Commission in its work in the Ware and Swift River watersheds, but *with an express prohibition upon the taking of any of the waters of the Millers River* (Mass. St. 1927, c. 321, § 2; Reprint of Answer, p. 54).

It is submitted that the legislative history preceding the enactment of the Massachusetts statutes lends no support whatsoever to the Connecticut contention that the Ware–Swift project is part of a much larger scheme of diversion. It is Connecticut's contention that the Legislature of Massachusetts indicated its intention to authorize a taking of waters of the Deerfield, Westfield, and Quaboag Rivers by expressly excluding only the Millers River; and that, had the intention been otherwise, the Legislature would have expressly negatived a taking from those rivers as well as from the Millers River. This argument is unfounded. The reason for the express exclusion of the Millers River in the Act of 1927 was that that particular river was recommended as a source in the report of the Commission upon which the act was founded, while the other three

rivers (Deerfield, Westfield, and Quaboag) were not definitely recommended by that Commission. The exclusion of the Millers River in the Act of 1927 was therefore merely the Legislature's method of emphasizing its rejection of the only source recommended other than the Ware and Swift Rivers.

It should be noticed that the 1922 report was not acted upon by the Legislature hastily and without proper consideration. Because of objections to the Joint Board Report (Exhibit C-1) by interested groups (Transcript, p. 72), another commission (generally known as the Gow Hazen Commission) made an examination of the situation, this commission being set up in substance as a Devil's Advocate to oppose the legislative canonization of the Ware-Swift project. Their report (House Document No. 900 of 1926), officially known as the report of the Metropolitan Water Supply Investigating Commission (not to be confused with the Metropolitan District Water Supply Commission, of which Dr. Winsor is Chief Engineer, Transcript, p. 72), recommended taking the Ware River flood waters, together with certain Eastern Massachusetts sources (including the Assabet, Ipswich, and Sudbury Rivers), for a supply for Metropolitan Boston. The Gow Report (Exhibit C-2) raised a far greater furor of objection than the Joint Board Report. The Ipswich Valley communities (Transcript, pp. 1593, 1744A, 1761, 1763, 1875; Joint Sum. pp. 218, 228, 237, 238, 250), Concord (Transcript, pp. 1613, 1711, 1715; Joint Sum. pp. 222, 236, 237), and the Assabet towns (Transcript, pp. 1613, 1715; see pp. 1605-1607; Joint Sum. pp. 222, 237, 219, 220) opposed the Gow scheme (see Exhibit C-2) vigorously on the ground that it would be a serious encroachment upon water sources which they themselves then needed or would shortly need for water supplies, as well as causing immeasurable damage to their communities by taking away water from very small streams needed for

process water in industry, and for the dilution of the inevitable sewage, industrial waste, and surface drainage of their heavily populated areas. Even ardent proponents of the Gow scheme admitted that it would be "simply a makeshift" for the Metropolitan District (see Transcript, p. 1875; Joint Sum. pp. 250, 251), and, as might be expected, the Massachusetts Legislature rejected it. It was not surprising, therefore, that the Massachusetts General Court adopted a substantial portion of the Joint Board Report of 1922 (Exhibit C-1) although, as we have stated, *it refused to adopt so much of the recommendations of that Board as involved any diversion of water from the Millers River* (see Transcript, pp. 31, 32, 48, 54, 93; Mass. St. 1927, c. 321, § 2; Reprint of Answer, p. 54). There is no merit in the Connecticut exception No. 17, page 12.

2. *Massachusetts not only Proposes to Comply with the War Department Rulings; It Must Do So.*

The Special Master found (Rep. Sp. M. 53) that "Massachusetts says she intends to divert no more water than the Secretary of War permits and in every way to follow the conditions he imposes. It is true that counsel in this case cannot control the future action of Massachusetts. But it is sufficient for this case to say that injunction should not issue against something merely feared at some indefinite time in the future. Injunction issues to stop present injuries or those presently threatened. The judgment in this case, if it goes in favor of Massachusetts, should settle her right to take only so much water and in such manner and at such times as the Secretary of War permits. It will in no way bar or diminish the right of Connecticut to proceed against the taking of additional future water. For this reason I disagree with the suggestion advanced by Connecticut on the hearing, that she is entitled at least to an injunction restraining Massachusetts from taking

any more water than the Secretary of War has authorized. As there is no threat on the part of Massachusetts to do that, such an injunction does not seem to me proper."

This finding and recommendation was entirely warranted. Counsel for Massachusetts, during the hearings, frequently stated for the record that Massachusetts proposed to abide by the War Department findings (see, *e.g.*, Transcript, p. 494), and it was so understood on both sides. The whole case was tried on the theory that Massachusetts was bound to conform to the limitations set by the Secretary of War. The Chief Engineer of the Massachusetts project (Dr. Frank E. Winsor) testified (Joint Sum. p. 25; Transcript, pp. 136-137) that he was intending to comply with the War Department findings and that he was making the plans for the project in compliance with those findings. Certain of the statements of alleged fact in the Connecticut exception numbered 7 (p. 9) are thus incorrect.

It is submitted that the Secretary of War has clear power to object to the execution of a project on a non-navigable tributary of a navigable river to the extent that the project will affect navigation on the main stream. *United States* v. *Rio Grande Irrigation Co.*, 174 U.S. 690, 707 *et seq.* The Special Master so ruled. The limitations and conditions imposed by the Secretatry of War in his findings were clearly in aid or protection of navigation, creating as they do restrictions upon the period during which any diversion from the Ware River may take place and, in the case of the Swift River, requiring as a condition of the execution of the project that Massachusetts guarantee a reasonable flow in the Swift River during dry seasons. In many instances this guarantee will result in a release of waters from storage in the proposed Swift River Reservoir in excess of the normal stream flow in that river at the time of the release of water (see Rep. Sp. M. 13, 18-19; see Exhibits opposite p. 19). As the Special Master put it (Rep. Sp. M. 13), the Secretary of War "required a discharge

from the Swift River Reservoir during the critical period of low water, which would increase instead of diminish the flow of water in the Connecticut [River], and to that extent better navigation." With the Secretary thus acting in aid of navigation, there can be no doubt of the obligation resting upon Massachusetts to comply with the Secretary's findings made in valid exercise of the authority delegated to him by Congress.

See *United States* v. *Sanitary District*, 266 U.S. 405, 425-426.

In view of the legal obligation of Massachusetts to obey the orders of the Secretary of War and in the face of the unequivocal expressions of the intention of Massachusetts to abide by the rulings of the Secretary, it is premature (as the Special Master said, Rep. Sp. M. 53) for Connecticut to urge (see Exceptions numbered 6 and 7, pp. 8-9) this Court to order Massachusetts not to do what she is bound not to do and what she has said that she has no intention of doing. Unless Massachusetts exhibits some inclination to disobey the Secretary's rulings, which have themselves the force of law, this Court, it is submitted, should assume that that Commonwealth will perform its full duty and obligations under the Constitution of the United States as it has done in the past.

D. The Findings of the Special Master, Not only Warranted, but Compelled by the Weight of the Evidence, Show that the Ware-Swift Project Will Cause No Material Injury to Present Connecticut Interests. Any Injury Suffered is De Minimis.

1. There is No Proof of Injury to Existing Interests of Navigation.

If, as Massachusetts contends is the case, the Special Master was correct in his determination (Rep. Sp. M.

13-17) that the finding of the Secretary of War is conclusive upon the issue of navigation, he then had no right or obligation to consider the issue of fact as to whether that finding was right. The Special Master, in order to clear up every possible issue in the case, did, however, pass upon the issue of fact of whether the Massachusetts project did affect unfavorably the interests of navigation upon the Connecticut River, and found that it did not. More specifically the Special Master found (Rep. Sp. M. 18) as follows:

> "The United States has aimed to maintain a channel of 10 feet over the numerous bars below Hartford. These have to be dredged out every year and the witnesses, who are shippers and masters of vessels in the trade, are in entire agreement in their story of difficulties at the lowest stages of water, when the depth on the bars at times falls even below 10 feet. This depth is considerably influenced also by the winds and tides as well as by the stage of water. There is no proof of difficulty in navigation at times when the stage of water is 12 feet or even 11 feet, 11 corresponding to an indication on the Hartford gauge of 3 feet. The discharge required from the Swift river reservoir during low water periods will somewhat benefit navigation. I cannot see how the diversion can injure navigation and therefore find that the proposed diversions will not interfere perceptibly or materially with the navigation of the Connecticut."

He also found (Rep. Sp. M. 5):

> "The total drainage area of both the Ware and Swift subject to diversion is 2.93 per cent of the total watershed of Connecticut river above Connecticut. Diversion of water to the extent authorized by the Secretary of War represents an average yearly subtraction from the flow of the Connecticut at the

> state line of about 2 per cent; but 94 per cent of this diversion occurs when the Hartford gauge reads above 3½ feet, which means 13½ feet depth of water. Two feet on the Hartford gauge indicates 10 feet of water, which is the depth the government heretofore has sought to maintain below Hartford. But a War Department project contemplates a future 12-foot channel and nearly all the diversion proposed will be when there is more than that depth of water."

That is, the 3½ feet on the Hartford gauge referred to in the foregoing quotation means 13½ feet depth of water in the channel when the War Department's project for the future channel depth is carried out and means 11½ feet of water in the channel even at the lesser depth which that Department seeks to maintain at present.

At page 19 of his report he put the situation as follows:

> "The maximum diversions are at high water and amount to from 5 to 6 inches, that is at periods of very high water the stage of the Connecticut may be reduced 5 to 6 inches, at medium stages less, and at very low stages its flow is increased."

The Connecticut exceptions numbered 2, 3, 4, 5, and 24 (Conn. Exc. pp. 5-7, 13-14) are to some extent at least based on the contention that these findings of the Special Master are not in accordance with the evidence. An examination of the evidence shows clearly that the Special Master was entirely correct in making the findings just quoted. To meet these Connecticut exceptions to the *facts* found, it is necessary to summarize the evidence at some length.

We have already pointed out that it appears clearly from the pleadings and the evidence that the Secretary of

War, upon the recommendation of the Chief of Engineers, *has* found that the diversions proposed by the Massachusetts legislation, with certain limitations set by his findings, will have no adverse effect upon navigation (Reprint of Answer, pp. 81-102; Transcript, p. 642). It also is clear that Massachusetts must and will adhere to, and comply with, the War Department limitations (Transcript, pp. 28, 29, 136, 137, 494; Joint Sum. p. 25).

The Connecticut River is accessible from the Atlantic Ocean and is navigated in interstate commerce with considerable regularity as far as Hartford (see Joint Sum. p. 37 *et seq.;* Transcript, pp. 665-668). Navigation for small craft above Hartford exists at certain seasons of the year (Transcript, p. 929; Joint Sum. p. 48), but no War Department project for navigation above Hartford has yet been adopted (Transcript, pp. 666-667; Joint Sum. p. 38). What water travel there now is between Hartford and Holyoke, Massachusetts, is almost entirely by pleasure boats (Transcript, pp. 667, 933; Joint Sum. pp. 38, 49).

Mean or average low water at Hartford occurs when the river level records 2 feet on the Hartford gauge (Transcript, pp. 678, 863, 914; Joint Sum. pp. 39, 45). Without dredging, the natural depth of the river over the bars at mean low water would be about 8 feet. All depths in excess of 8 feet are obtained by dredging (Joint Sum. p. 40; Transcript, p. 836), which is done entirely by the United States (Transcript, p. 837; Joint Sum. p. 40), and continues for several months each year (Transcript, p. 835; Joint Sum. p. 40). Dredging operations, however, do not begin until after the flood period, because of the fact that the floods and freshets fill up the bars (see Transcript, pp. 683, 846, 864, 927, 950).

No evidence of purely *intra*state commerce on the Connecticut River was presented (see Transcript, pp. 668-674, 843, 854, 911 *et seq.*, 923, 928). All commerce men-

tioned in evidence was interstate commerce, unless pleasure boating constitutes commerce.

The effect of tide is felt as far up the river beyond Hartford (Transcript, p. 254; Joint Sum. p. 27) as the Enfield dam, but not beyond (Transcript, p. 937). The tidal variation, which at Hartford is from 14 to 18 inches and at Saybrook (at the mouth of the river) is nearly 3 feet (Transcript, p. 841), totally disappears at Hartford when the Hartford gauge stands above 6 feet (Transcript, p. 1418, p. 254). [Enfield, Connecticut, where the Enfield dam is situated, is not to be confused with Enfield, Massachusetts, the site of the proposed Swift River Reservoir.]

Certain of the witnesses with navigating experience (see Joint Sum. p. 39 *et seq.*) on the river testified that during periods of comparatively low water the method of taking barges up the river is by working the tides; *i.e.*, a barge tow will leave Saybrook two and a half or three hours before high water in New London, go up the river as far as it can on the flood tide, and then wait for the next tide (Transcript, pp. 841, 851; Joint Sum. pp. 41, 43). These witnesses testified that they load their barges to meet the necessities of the particular river depth on each day, occasionally lightening the load as much as 300 tons below capacity in periods of low water (Joint Sum. p. 43; Transcript, p. 852). A full load apparently is carried only in freshet time (Transcript, p. 858). Tugs can be adjusted by letting out water ballast (Joint Sum. p. 44; Transcript, p. 856) so as to draw 9½ feet in the river and 11 to 12 feet outside in Long Island Sound (Transcript, p. 854; Joint Sum. p. 44). The tugs used in the river and in the sound are the same, and they haul the tows the whole trip from New York or New Jersey ports, where the barges are loaded, to Hartford (Joint Sum. p. 44; Transcript, pp. 854-855, 863). The load of the barges is based on the condition of the river as reported to the barge captain, at the point of loading, by the Hartford offices through the

New York office (Joint Sum. p. 44; Transcript, pp. 857, 863). One captain testified that he never received reports of changes of an inch or less in the reading of the Hartford gauge (Joint Sum. p. 44; Transcript, p. 858), and never made adjustments of ballast to such a fine point (Joint Sum. p. 44; Transcript, p. 856). Another witness testified that, although a very small amount of water more or less might make a difference when a barge was aground, he believed that very small variations were too "fine" to take into account (Joint Sum. p. 46; Transcript, p. 922). There was testimony to the effect that, when the gauge readings start to drop, the water level in the river drops very fast (Joint Sum. pp. 51, 52-53; Transcript, pp. 949, 955), so it is a fair inference that variations in flow of several inches make no difference in the depth to which barges are loaded, inasmuch as under natural conditions a very considerable change in river conditions could take place between the time the barges were loaded in New Jersey and the time when they reached Hartford.

Connecticut witnesses testified that the critical period of extreme low stages, apparently principally in September and October, is the period when water is most needed (Joint Sum. pp. 42, 44, 46, 47-48; Transcript, pp. 844, 862, 919, 926-927), and when additional water would be most useful. At such times frequently a northwest or westerly wind minimizes the beneficial effect of the tide (Joint Sum. pp. 42, 52; Transcript, pp. 844-845, 954). At the higher flows, navigation would not be embarrassed by a diminution in flow (Joint Sum. pp. 46, 47; Transcript, pp. 919, 921, 925; see p. 918), and the passenger boats at least would not be impeded if the river level were at all times (Joint Sum. p. 46; Transcript, p. 920) about 2 feet on the Hartford gauge. At such times the removal of an inch or two of water would make slight difference.

The very high freshet flows, besides making navigation difficult (Joint Sum. pp. 47, 51, 44; Transcript, pp. 926,

944, 949, 862), damage shore property (Joint Sum. p. 51; Transcript, p. 949) and fill up the bars, thereby removing the beneficial effects of dredging (Joint Sum. pp. 39, 42, 47-48, 51-52; Transcript, pp. 683, 846-847, 864, 926, 928, 949, 950). One witness for Connecticut testified that, because of the tendency of freshets to build up the bars (see, *e.g.*, Transcript, p. 950), navigators on the river would be glad to dispense with a good deal of water between March and May when they did not need it and did not want it. In the opinion of two Connecticut witnesses navigation would be benefited by a regulated flow (see, *e.g.*, Joint Sum. p. 48; Transcript, pp. 927, 1001).

Two other factors contribute to navigation difficulties on the river. The first of these is the noticeable decrease in the depth of the river caused at times of low flow by ponding of water over week-ends in the Enfield dam (in Connecticut), upstream from Hartford, and in other dams (Transcript, pp. 842, 917, 924, 957; Joint Sum. pp. 41, 46, 47). The other factor was mentioned by a Connecticut witness who testified that the barge traffic on the river had some tendency to delay and block passenger boats, and in his opinion that traffic was "getting to be more trouble than the low water" (Transcript, pp. 921, 923, 926; Joint Sum. pp. 46, 47).

From these facts, which appear through the disjointed and somewhat confusing testimony of a multitude of witnesses, we can get some picture of navigation on the river as it now is. Navigable depth is maintained only by dredging—a constant battle with the tendency of the floods and freshets to fill up the sand-bars. In flood times an embarrassingly large amount of water is available, and in periods of low flow barges cannot load to capacity, either because the water is already too low to carry a full load or because of the fear that the water in the river will drop between the time the barge is loaded in New York or New Jersey and the time it reaches the river. At high-flow seasons a diver-

sion or diminution in water will tend to be a benefit; in low-flow seasons an addition of water will tend to be a help. In seasons of moderate flow the diversion or addition of a hundred cubic feet per second one way or another will probably either be incapable of measurement (see Transcript, p. 641) or it will have no appreciable effect on barge loading, because of the fear that other causes—tide, wind, and ponding by mills, or sometimes even ponding alone—will cause even a greater drop in stream flow.

[This summary statement of the evidence on issue of navigation has been abbreviated as much as we believe is consistent with an adequate presentation of the case. A statement in greater detail will be found in the Massachusetts Brief before the Special Master at pages 47 to 61. Copies of the brief referred to, bound in green, are on file with the Clerk of this Honorable Court.]

The hydrograph, introduced in evidence by Massachusetts (Exhibit D-4), of which two sample years (Exhibit D-2 and D-3; see Joint Sum. p. 22; Transcript, p. 106 *et seq.*) were inserted in the Special Master's Report (opposite p. 19), shows how slight is the effect of the Massachusetts project in the critical periods of low flow. This hydrograph (Exhibit D-4) was testified by M. B. Jacobs, Connecticut's expert, to be substantially correct (Joint Sum. p. 27; Transcript, p. 252). The Special Master therefore was entitled to rely, as he evidently did, upon this graphic proof of the reasonableness of the Ware–Swift project. An examination of this hydrograph reveals clearly what Dr. Winsor testified (Joint Sum. p. 26; Transcript, p. 1416 *et seq.*)—that the great bulk of the diversion takes place during periods of high flow in the Connecticut River. This is also apparent from a Connecticut exhibit (Exhibit 25-B), which shows that on the average, during 9% of the time, the Hartford gauge at low tide stands at or below 1. At such times there would on the average be an

addition to the normal flow of 62 cubic feet per second by a release from storage in the Swift River under the War Department findings. The Hartford gauge (according to this exhibit) during 22% of the time on the average at low tide stands at 2 feet (*i.e.*, mean low water at Hartford). During such periods, when the Hartford gauge at low tide stands at 2 feet, the release from the Swift River Reservoir in addition to the normal flow of the river would on the average amount to 18 cubic feet each second. The gauge at low tide stands at 3 feet (which is 1 foot above mean or average low water at Hartford and 13 feet above project channel bottom) on the average 15% of the time. During this period, because no damage will result thereby to navigation, in the opinion of the Secretary of War, an average diversion of 125 cubic feet per second is permitted by the War Department. From this point on, the amount of average diversion increases with the increase in gauge reading. For instance, when the gauge stands at 4 feet, the average diversion is 180 cubic feet per second; when the gauge stands at 6 feet, 395 cubic feet per second; when at 12 feet, 1098 cubic feet per second. Thus, upon Connecticut's own evidence, the average effect of the Massachusetts project is to add some water to the natural flow of the Connecticut River at times when the Hartford gauge stands at mean or average low water or below it, *i.e.*, during what the Connecticut River mariners referred to as the critical periods. The bulk of the diversion takes place when the water is high and navigation will not be affected in any degree.

Of course average figures do not represent the condition which would be found on every occasion when the Hartford gauge stands at any particular level (Transcript, p. 638). Wind, tide, and ponding above Hartford may cause variations from the average condition. The flow on the Connecticut River as a whole may be high and

the Swift drainage area may be unusually dry, or *vice versa*. These possibilities account for variations from the normal situation under the War Department findings. The War Department findings were based upon the principle that a discharge of 4900 cubic feet per second in the Connecticut River at the Sunderland Gauging Station on the average corresponded to a Hartford gauge height at low tide of 2.1 feet and a discharge of 4650 cubic feet to a Hartford gauge height at low tide of 2.0, which is mean or average low water (Reprint of Answer, p. 99). A reading of 2.0 on the Hartford gauge is the water condition which represents the average navigable capacity. To maintain this condition on the average a flow of .58 cubic feet per second per square mile of drainage area is necessary (Joint Sum. p. 217; Transcript, p. 1435). It is this average flow per square mile which the War Department has required Massachusetts to guarantee (when the low tide at Hartford is at 2.0 or below) from the portion of the Swift River watershed above the proposed point of diversion, by assuring that the Swift River will always have 110 cubic feet per second flowing in it. [See Reprint of Answer, p. 100; 186 (square miles of Swift River drainage area above point of diversion) x .58 cubic feet per second = 107.88 cubic feet per second, which is less than the guaranteed flow required by the War Department.] The flow at Sunderland is merely a convenient method of determining when the flow of the river is so reduced that on the following day the Hartford gauge will on the average low tide read at 2.1 feet or lower. The Sunderland flow is thus in the nature of a signal to Massachusetts of the need of a release of water to maintain the average level of water at Hartford. Although the War Department principle is sound, departures from the average will occur because of varying local conditions in different parts of the watershed of the Connecticut River, and it is these departures from the average

which are reflected in days such as are shown on the third page of Exhibit C-41. In laying down a general rule the War Department could not heed the occasional unusual day, but necessarily based its conclusions upon average or representative conditions.

[The complainants introduced two deceptive and misleading exhibits (Exhibit C-5, Joint Sum. p. 27 *et seq.*; Transcript, p. 254 *et seq.*; esp. pp. 258-259; Exhibit C-9, Transcript, p. 286), which were based on the erroneous theory that the Massachusetts project involved the taking of water, not only from the Ware and Swift Rivers, but also from the Millers River, the Quaboag River, the Westfield River, and the Deerfield River. These two exhibits are drawn up *on a wholly unwarranted Connecticut theory* that the Massachusetts project involves a diversion four and three-quarters (4¾) times as large as the project *actually* authorized in 1926 and 1927 by the Massachusetts Legislature (Transcript, p. 259) and involving a diversion from a drainage area of 919 square miles in addition to the 284 square miles above the points of diversion on the Ware River and the Swift River. As shown on Exhibit C-5, even this imaginative, mythical diversion does not seem to have any very great effect on the flow of the Connecticut River at Hartford. Whatever might be the effect of such a project, it is not the Massachusetts project as set forth in the Massachusetts legislation, and still less as modified by the War Department findings.]

It is submitted that the findings of the Special Master as to the actual effect of the Massachusetts project upon navigation should be approved, and that there is upon all the evidence no merit in Connecticut's exceptions numbered 3, 4, and 24 (Conn. Exc. pp. 5-6, 13-14). Exception numbered 25 (Conn. Exc. p. 14) is discussed *infra* (Part II, this brief) together with the exceptions as to the law (Conn. Exc. Nos. 26-38; pp. 15-17).

2. *There will be No Injury to Connecticut because of Increased Pollution of the Connecticut River if the Massachusetts Project is Carried Out.*

(The evidence on this issue is summarized, Joint Sum. p. 85 *et seq.*)

The Special Master found (Rep. Sp. M. 28):

> "I think the plaintiff has failed to prove that the proposed diversion would perceptibly increase Connecticut river pollution, and consequently that there is no satisfactory proof of material pollution damage to the Connecticut to result from installing and operating the proposed Ware and Swift works."

The Connecticut exception numbered 54 (Conn. Exc. p. 24) apparently objects to this finding as unwarranted by the evidence, though the purpose or materiality of the exception is far from clear.

We think upon this branch of the case that the evidence of a Connecticut witness, Professor Winslow of Yale (whose testimony, uncontradicted, is quoted in the Special Master's Report, pp. 24-28), is conclusive proof that the finding of the Special Master was in all respects warranted. The evidence of all the other expert witnesses, called by both States, was to the same effect as Dr. Winslow's evidence—that the Massachusetts diversion as limited by the War Department findings could have no perceptible effect upon the pollution of the Connecticut River (see Transcript, pp. 475, 1396 *et seq.*, 1493 *et seq.*; Joint Sum. pp. 109, 126, 133 *et seq.*).

The various expert witnesses testified that the best measure of the state of a river with respect to pollution is what is known as its "population capacity." *Population capacity* is the capacity (expressed in terms of population) of the river to oxidize sewage and industrial wastes in addition to the load of sewage and industrial wastes actually

in the river at that point. For convenience this capacity to care for sewage and industrial wastes is expressed in terms of the number of persons whose sewage could be digested by the river at that point *in addition to* the pollution already in the river (Joint Sum. pp. 124, 130; Transcript, pp. 1391-1392, 1482). As Professor Phelps, a witness called by Massachusetts, put it (Joint Sum. p. 130; Transcript, p. 1482), the *population capacity* of a stream "represents in brief the reserve capacity of the stream to care for additional pollution over and above that which it now contains and to carry that pollution to the sea without the production of a resulting nuisance. . . ." *Population capacity*, he said, represents "the net balance over and above everything that is in the stream or that has happened to the stream by way of pollution in the past . . ." (Transcript, p. 1483; Joint Sum. p. 131).

Plaintiff's Exhibit C-20 (see Joint Sum. p. 105 *et seq.*) indicates that at the state line the total *equivalent population* (contributed by Massachusetts), which, of course, reflects industrial as well as human wastes, is 546,590. When the experts referred to *equivalent population* they meant the amount of waste, both human and industrial, contributed to the river above a given geographical point expressed in terms of population, assuming that an average human being produces a given amount of waste. [The total equivalent population above the state line, including New Hampshire and Vermont, Dr. Rudolfs said was 619,740 (Joint Sum. p. 105; Transcript, p. 451). The Vermont and New Hampshire pollution is so far upstream that by the time it reaches the Massachusetts–Connecticut state line it has all been oxidized (Joint Sum. p. 106; Transcript, p. 452). There is very little pollution from industry in New Hampshire or Vermont along the Connecticut River (Joint Sum. p. 106; Transcript, p. 452).] Defendant's Exhibit D-14 shows the *population capacity* above the Massachusetts–Connecticut state line from October,

1928, to November, 1929, inclusive. In every month but one during which there will be an actual diversion, the *population capacity* as shown thereon is more than twice the significant *equivalent population* above the state line as shown on Plaintiff's Exhibit C-20, and it is to be borne in mind that *population capacity* as expressed in Exhibit D-14 represents a surplus capacity at the state line over and above the present demand made by all wastes at that point. On Exhibit D-14 the lowest figure of population capacity during a month in which an average diversion is made is 649,000 for the month of July, 1929. Assuming that by a doubling of the Massachusetts population above the state line an additional 546,590 *population equivalent* was added, there would still be a *population capacity* of over 100,000 at the state line.

Exhibit D-14 also shows that in a dry month, such as August, 1929, the *population capacity* at the state line would have been increased or improved by 5000 as a result of the release of pure water from the Swift River Reservoir had the Massachusetts project been in existence at that time (Joint Sum. p. 132; Transcript, pp. 1484 *et seq.*). It appeared clearly from the evidence and the exhibits that at all times of extreme low flow, when the river appeared to be most closely approximating an objectionable condition, that, had the Massachusetts project been in effect at that particular time, the state of the river would have been better than it actually was because of the fact that, under the War Department findings, Massachusetts would have been required to release from the Swift River Reservoir more water than was actually flowing in the river at the time.

Mr. Robert Spurr Weston, an expert witness called by Massachusetts, explained that the dissolved oxygen in the river (and as a result the capacity of the river to dilute sewage) rapidly increases in quantity below the state line, and that at Rocky Hill, about 7 or 8 miles below the point

at which the Hartford sewage is emptied into the river, the population capacity of the river is much greater than it is at the state line. This increase in dissolved oxygen is due chiefly to re-aeration (*i.e.*, restoration of the dissolved oxygen content of the water through contact with the air), and it is undisputed that a heavily polluted stream will absorb more oxygen from the air by re-aeration than a slightly polluted stream. This improvement in the river just below the state line found by the Special Master to exist (Rep. Sp. M. 24) was admitted by the expert witnesses called by Connecticut (see, *e.g.*, Joint Sum. pp. 113, 114; Transcript, pp. 535, 548).

In view of this improvement of the river between the state line and a point below Hartford (despite the fact that the sewage of Hartford is turned into the river in the meantime), it can not be said that the river which is already far from being a nuisance at the state line will be rendered a nuisance by the Massachusetts project. It appears therefore from the evidence:

1. That although the Connecticut River at the state line is somewhat polluted, it is not now creating a nuisance at that point.

2. That if the Massachusetts diversion, as modified by the War Department findings, were in effect, there would not be any appreciable difference in the state of the river.

3. That the river still contains enough dissolved oxygen, even in exceedingly dry periods, to enable it successfully to dilute and carry away considerably more domestic and industrial waste than is now found in the stream at that point.

4. That at the most critical periods, in times of low flow, the state of the river would be better than it is now because of the releases of water from the Swift River Reservoir required under the War Department findings.

The Special Master was clearly correct in his finding that no damage would be done to Connecticut by the Mas-

sachusetts project because of any increase in pollution of the Connecticut River.

It should be pointed out here that the Special Master's finding (Rep. Sp. M. 53-54, questioned by Conn. Exc. No. 55, p. 24) as to the practice in Massachusetts and Connecticut, and in New England generally, with respect to the pollution of large streams was entirely warranted by the evidence. Attempts have been made in the past in both States to clean up highly polluted waters and to prevent future pollution (Joint Sum. pp. 142, 277 *et seq.*; Transcript, p. 980 *et seq.*). Progress, however, has been slow, as witnesses called by each State testified (see, *e.g.*, Joint Sum. pp. 148, 220, 270 *et seq.*; Transcript, pp. 995, 1605 *et seq.*), partly because of the obstacle of expense (Joint Sum. p. 222; Transcript, pp. 1615, 2080); partly because in some cases pollution has already gone so very far as to be hopeless (Joint Sum. pp. 148, 220 *et seq.*; Transcript, pp. 995, 1609); partly because some industrial wastes cannot be treated (Joint Sum. pp. 147, 221; Transcript, pp. 994, 995, 1612). Although, as the Special Master suggested, the condition of industrial streams in both States is now far from praiseworthy, it is a condition which has been allowed to exist by both. Some improvement may be in progress, and doubtless modern methods will bring a more rapid advance in the future. For the present, however, the situation is as the Special Master found it to be. Connecticut in this suit, which is not a suit to abate a pollution nuisance, cannot complain because Massachusetts has done to streams within her borders what Connecticut herself has permitted in her own rivers for generations. [See the cases cited *infra* as to the Connecticut law as to reasonable use of waters by riparian owners; *e.g.*, *Stamford Extract Mfg. Co.* v. *Stamford Rolling Mills Co.*, 101 Conn. 310.] Inasmuch as the particular act of Massachusetts complained of in this bill in equity has been found to have no tendency to increase the pollution of the

Connecticut River, it would seem to be immaterial that the river is already polluted in both States. The fact that the Special Master has found, and was warranted in finding, that the proposed diversions will not make the situation of the Connecticut River from the standpoint of pollution worse would seem to dispose of exceptions 54, 55, and 56.

3. Agriculture in Connecticut will not be Damaged in Measurable Degree by the Massachusetts Project.

The Special Master found (Rep. Sp. M. 20):

> "The lessening of spring floods will have its advantages and disadvantages. It will lessen some damages and increase others. On the whole I think the damage to the hay land is not shown to be of 'serious magnitude'; and that such damage, far from being 'established by clear and convincing evidence', is shown by no evidence making it possible of computation or proving that it is large."

The Connecticut contention was that the reduction in the height of spring floods because of the diversion under the Massachusetts project would affect adversely the fertility of lands subjected to inundation in these floods, particularly certain hay lands near the course of the Connecticut River within the State of Connecticut.

Exceptions Nos. 48, 49, and 50 substantially contend that the findings of the Special Master summarized in the passage just quoted above were not warranted by the evidence. In order to meet these exceptions, it is necessary to state to some extent the evidence introduced before the Special Master on the subject of the damage to agricultural lands in order that it may be clear that the Special Master had substantial evidence before him for consideration which would warrant him in finding as he did. [A full statement of this evidence would take an undue amount

of space. It was fully summarized in great detail by Massachusetts in a brief submitted to the Special Master at the close of the hearings before him. Copies of this printed brief (bound in green) are on file with the clerk of this Honorable Court and may be referred to for a statement of the evidence in detail. The pertinent material will be found at pages 75 through 80 of that brief.]

The Stipulation.

As the Special Master pointed out (Rep. Sp. M. 19), much of the evidence actually offered to sustain the allegations of damage with respect to the agricultural land was superseded by a stipulation entered upon the record (Joint Sum. pp. 75, 76; Transcript, pp. 888-890). From this stipulation it appears that an area of about 9500 acres of land in Connecticut is periodically covered by the annual freshets, and that these freshets enable the owners of this land to grow hay on such land without fertilizer. This hay when cured is either used to feed animals belonging to the owner of the hay field or it is sold in the spring following the harvest for approximately $26 a ton. Hay sold standing is worth from $10 to $15 an acre.

It is further agreed—

1. That without any flood water this hay land could not grow as large crops of hay without fertilization;

2. That any diminution in the floods would be a detriment to so much of the land as would not, because of such diminution, be flooded at all;

3. That the average spring freshet varies from about 17 to 25 feet above the low level (which is zero on the Hartford gauge, Transcript, p. 268) of the river;

4. That practically no crops other than hay are grown on any of the land which is regularly flooded.

The stipulation, taken alone, falls far short of showing that substantial damage results from a diminution in the

height of a flood flow of from 1 to 5 inches, which is the amount of diminution in river depth at Hartford which would result (during freshets over 16 feet on the Hartford gauge) from the diversions authorized by the Massachusetts legislation as modified by the War Department findings (Transcript, p. 263 *et seq.*; see Complainant's Exhibits C-6*a* and C-6*b*).

Some general evidence was offered through Connecticut farmers (see Joint Sum. p. 58 *et seq.*) tending to show that a diminution of flood flows would result in less land being flooded (see, *e.g.*, Joint Sum. p. 65; Transcript, pp. 766, 782), and in a diminution in the quality of the hay (see, *e.g.*, Joint Sum. p. 68; Transcript, pp. 800, 826). Dr. Morgan, Soil Expert of the Connecticut Agricultural Experiment Station, testified that the land actually covered by the flood water was highest near the river, sloping back gradually until it reaches a point where the land rises rapidly (Joint Sum. p. 77; Transcript, p. 894); that the area sloping back from the river is covered to a varying degree by different floods because of the conformation of the land (Joint Sum. p. 77; Transcript, p. 894); that a diminution of 3 inches in the stage of a normal flood would make a noticeable difference in the amount of land covered, but that a similar reduction in a very high flood would not make any significant difference, because the higher land rises very abruptly (see Joint Sum. p. 78; Transcript, p. 895); that, as a practical matter, no farmer would fertilize the portions of his hay field not touched by the floods (see Joint Sum. p. 78; Transcript, p. 896). No evidence was introduced by Connecticut which had any tendency to show precisely how much less land would be flooded by a flood reduced by the Massachusetts diversion.

The evidence as to the effect of the variation in the flood height upon the hay crop was unconvincing (see Joint Sum. p. 59; Transcript, pp. 748, 752) and indefinite (see,

e.g., Joint Sum. pp. 70, 71; Transcript, pp. 818, 826). Under cross-examination by counsel for Massachusetts each farmer who was asked the question testified that he cut a good crop of hay during the war years (see, *e.g.*, Joint Sum. pp. 68, 71; Transcript, pp. 795, 801, 820, 827, 828). It appears from Complainant's Exhibit C-6 that there were only four days in 1917 and four days in 1918 on which the Hartford gauge stood above 16 feet, as follows:

1917, March 29, 30, and 31; April 24: Highest point reached 18.3.
1918, April 3, 4, 5, 6: Highest point reached 18.8.

In these two years the flood season was shorter than in any years recorded upon the exhibit, and the flood did not reach, during these two years, a depth 2 feet above 17 feet on the Hartford gauge, which the stipulation (see Joint Sum. p. 76; Transcript, p. 890) describes as the minimum height of an average flood. Obviously, if the depth of the flood made any substantial difference in the fertility of the land covered, it would have been apparent in these years in which the floods were at a minimum. It is equally apparent that the variation of 8 feet in the height of the normal floods (see Joint Sum. p. 76; Transcript, p. 890) would have considerably more effect upon the quality of the hay crop in the flooded areas than a variation in the flood, due to the Massachusetts project, of from 1 *inch* to 6 *inches* (see Complainant's Exhibit 6).

The testimony of the farmers as to the height of flood flows did not appear to be based upon any very accurate information, but rather upon general impressions (see, *e.g.*, Joint Sum. p. 72; Transcript, p. 829), and it is apparent that other elements affect the hay crop fully as much as the depth of floods—as, for example, rainfall (see Joint Sum. pp. 68, 80; Transcript, pp. 800, 807; see p. 902). Farmers and local assessors who testified indicated

that the flooded area was much less valuable than the higher land back from the river (see, *e.g.*, Joint Sum. pp. 60, 68; Transcript, pp. 758, 803, 810). There was also testimony by Connecticut farmers that they began to raise the more valuable crops, such as vegetables and tobacco, at a point just beyond the flood line (Joint Sum. pp. 59, 69; Transcript, pp. 755, 822; see Stipulation, Joint Sum. p. 76).

There was considerable evidence of damage caused by high floods, particularly the 1927 flood (Joint Sum. pp. 61, 62, 64, 73; Transcript, pp. 763, 765, 779, 867). One witness testified that a low flood was worse than a high flood, because the high flows washed the debris away (Joint Sum. p. 59; Transcript, p. 751). There was also evidence that certain real-estate developments built on low land were badly damaged by flood flows (Joint Sum. p. 64; Transcript, pp. 779, 781), and the Mayor of Hartford, as the Special Master found (Rep. Sp. M. 20), testified to the large damage to that city from floods, as a result of which considerable expenditures are now being made for dikes and flood walls (Joint Sum. pp. 83-84; Transcript, pp. 1207 *et seq.*, 1229, 1230 *et seq.*). The testimony of Mayor Batterson is in itself a sufficient answer to exception numbered 47 (Conn. Exc. pp. 20-21) and shows that the Special Master's finding was warranted.

It is submitted, therefore, that the proof by Connecticut falls far short of showing by convincing evidence that floods are an unmixed blessing to Connecticut agriculture. There is evidence from witnesses offered by the complainant that the floods are a menace to the public welfare of the State to a marked degree. Upon the precise issue of the case, so far as it concerns agriculture, there is nothing more than the hazy guess of a number of local residents as to the probable effect of a diversion of flood flows lowering the river at Hartford from 1 to 6 inches (as shown by Exhibit C-6*b*)—or by 1 to 1½% (Joint Sum. p. 79; Transcript, p. 898—assuming a 3-inch variation due to diver-

sion). Since the extent to which any evil results of the Massachusetts project would be felt by Connecticut farmers is a matter of mere conjecture, and, inasmuch as the Special Master was warranted in his findings, exceptions Nos. 48, 49, and 50 (Conn. Exc. pp. 21-23) are without merit. The entire area specified in the stipulation as receiving any benefit at all from any floods is 9500 acres, or 14.84 square miles. There was no evidence to warrant a finding that any substantial portion of this area would not be flooded because of a slight reduction in the height of floods. It cannot be said that Connecticut has shown that the Massachusetts project will cause substantial damage to agriculture, sufficient to entitle her to injunctive relief against a sister State.

Comments on Particular Connecticut Exceptions as to Alleged Agricultural Damage.

Exceptions numbered 51 and 52 (Conn. Exc. p. 23) misstate what the Special Master found. His conclusion (Rep. Sp. M. 20) was that the "damage to hay land is not shown to be of 'serious magnitude' and . . . far from being 'established by clear and convincing evidence' is shown by no evidence making it possible of computation or proving that it is large." This is far from a holding [as suggested in exception No. 51] that it was incumbent on Connecticut to show the precise money damage suffered by particular property provided the damage was shown to be of serious magnitude (which it was not), and is, of course, in no sense a finding [as the complainant urges in exception No. 52] that the rights of the Connecticut farmers owning riparian land in the river valley are not "property." These exceptions and exception No. 53 (Conn. Exc. p. 23) are disposed of by the findings of fact of the Special Master under the rule laid down in cases like *North Dakota* v. *Minnesota*, 263 U.S. 365, 374 (see Rep. Sp. M. 7).

4. No Existing Connecticut Power Plant will be Affected by the Massachusetts Project. Complete Compensation for Any Injury to Potential Future Developments can be Made by the Payment of Money Damages.

There is no express allegation in Connecticut's bill that the diversion will in any way affect power interests in that State. Under general allegations of injury to persons and property in the Connecticut River Valley in Connecticut (see Bill, pars. 13, 16, 17-21, pp. 6-8, 9, 10, 11), the complainant was permitted to introduce evidence as to the effect of the Massachusetts project on Connecticut power. The Special Master found that "only one possible power development is shown" (that at King's Island, Rep. Sp. M. 20) and "that no present use of the waters for power purposes will be disturbed." He further found, in accordance with the undisputed evidence, that the only damage would be in the event of the construction of a projected 50,000 horse-power redevelopment at King's Island, just below the Connecticut–Massachusetts boundary. As to this redevelopment, he found that, although the proposed new dam at King's Island has been authorized by the Federal Power Commission, the "work so far as the testimony shows has not been resolved on by the company, and so far as shown the required capital has not been subscribed or arranged for." Giving effect to the limitations upon the Massachusetts project resulting from the War Department findings, the Special Master found that the proposed plant when erected would be damaged to the extent of $80,000. He reached this figure in the following manner (Rep. Sp. M. 21). Under the War Department findings, the actual loss of power "attributable to the diversion would amount to $7920 per year valuing each kilowatt hour lost at 6 mills; $7920 per year capitalized at 5 per cent is about $160,000." From this sum he deducted $80,000, which is the saving in capital investment resulting from the increase in extreme low stream flows of the Con-

necticut River brought about by the requirement of release of water in the War Department findings. The water so released in times of *low* flow will produce in excess of 1000 additional horse-power. This additional water would, therefore, result in an increase of that amount (1000 horse-power) in the *minimum* water power, upon which the power company could depend at all times, and a corresponding decrease in the size and capacity of auxiliary steam-power plant required to enable the power company to fulfill its contracts with its customers in times of *low* flow. The fair cost of auxiliary equipment capable of producing 1000 horse-power by steam would be about $80,000.

These findings of the Special Master were completely warranted by the evidence. The amount of damage to the proposed redevelopment due to loss of productive results in terms of kilowatt hours per year under the War Department restrictions was taken by the Special Master from the testimony of Connecticut's own experts (see Joint Sum. p. 56 *et seq.*; Transcript, pp. 374-375). Each kilowatt hour was valued by Connecticut at 6 mills, a figure which at least one Massachusetts witness testified was, in his opinion, high (see Joint Sum. p. 57; Transcript, p. 2024), inasmuch as most of the power loss would occur in times of high flow when the water could not be economically used. The power generated at such times would be surplus power and probably somewhat of a drug on the market because of the fact that other large power developments in the neighborhood would also have power for sale at such flood seasons. In giving a value of $80,000 to the increase in extreme low flows upon the Connecticut River with the corresponding decrease in the size and capacity of the auxiliary steam-power plant which the power company would require, the Special Master followed the testimony of an eminent electrical engineer, Mr. Weston Fuller, called by Massachusetts (Joint Sum. pp. 56, 57;

Transcript, p. 2023). As the Special Master states, there was no dispute of Mr. Fuller's testimony upon this point. It seems apparent that every interest, both of the State of Connecticut and of the power company, would be protected, therefore, if Massachusetts pays for the capitalized value of the actual reduction in kilowatt hours of power capable of being generated per year. The State will be compensated, because the power company situated within its borders will have the financial ability (furnished to it by Massachusetts in the form of damages) to generate just as much power with the aid of auxiliary steam plant as it could have developed before by water. The company will be made whole because it will have been paid as much by Massachusetts for the lost power as it could have possibly received from any customers. To a certain extent it will be in a better position, because it has in the form of additional water during low flows a more dependable minimum supply than it would have had without the execution of the Massachusetts project.

An Adequate Remedy at Law.

An adequate remedy at law is given under the law of Massachusetts to the Northern Connecticut Power Company and to any other persons damaged by the Massachusetts project, both by statute and by common law. The last paragraph of section 5 of chapter 375 of the Acts of 1926 (which act authorizes the Ware River diversion) provides as follows:

> "The owner of any real estate, whether within *or without* the commonwealth, which is not taken but is injured by the taking of the waters of Ware River under authority of this act or by the construction of the works incidental thereto, shall be entitled to damages therefor and may recover the same from the com-

> monwealth as in the case of a taking in accordance with the provisions of this act." [Italics ours.]

This quotation clearly shows that, as far as the Ware River taking is concerned, a proper remedy is provided for recovery of damages by the Northern Connecticut Power Company.

The language of sections 4 and 7 of chapter 321 of the Acts of 1927 (Reprint of Answer, pp. 55-57, 62), which authorizes the Swift River diversion, is broad enough to provide for recovery by any person whose property is injured either within or without the Commonwealth, and to authorize settlement of damage claims with any such persons.

Both the Ware and Swift River acts, with certain exceptions not here material, provide that the takings shall be in accordance with chapter 79 of the General Laws of Massachusetts (1921), dealing with the subject of eminent domain (Ware River: Mass. St. 1926, chapter 375, section 5; Swift River: Mass. St. 1927, chapter 321, section 4). Chapter 79 provides generally for a remedy to *any* person whose land is taken or injured, and is not restricted to persons or places within the Commonwealth. Indeed, the chapter specifically provides a remedy for the taking or injuring of land outside the Commonwealth. Section 11 of chapter 79 provides in part as follows:

> ". . . If land injured by a public improvement lies outside the commonwealth, the petition may be made to the board which would have jurisdiction if it lay in the same county or in the same town as such public improvement."

Section 14 of chapter 79 provides in part as follows:

> ". . . If the land injured lies outside the commonwealth, such petition shall be filed in the superior

court of the county in which the public improvement which caused the injury is situated."

All of the above sections taken together clearly indicate that a resident or non-resident of the Commonwealth owning land situated outside of the Commonwealth which suffers damage because of a public improvement within the Commonwealth is entitled to recover damages in an eminent domain proceeding for any injury to his property resulting from such public improvement. The Northern Connecticut Power Company is included within the scope of the statute and can present its claim for damages in the courts of Massachusetts, and will be accorded the same remedy and treatment as is accorded to residents of the Commonwealth claiming damage to land situated therein.

A Common Law Remedy.

In addition to such remedies as are contained in the above statutes, the common law of Massachusetts as set forth in the case of *Manville Company* v. *City of Worcester*, 138 Mass. 89, provides for a recovery in an action of tort by a non-resident for damages sustained to his property located outside the State caused by a diversion within the State of waters from an interstate stream. In this case the plaintiff was the owner of a mill in Rhode Island upon the Blackstone River and the defendant city had withdrawn in Massachusetts sufficient waters of a tributary of that river to affect materially the operation of the mill. The defendant asked for the following ruling of law: "The diversion of the waters of a natural stream in this State and preventing the same from coming to the plaintiff's mill situated in Rhode Island is not a tort for which the plaintiff can recover in the courts of this Commonwealth." The Court held that this ruling was refused rightly, and stated that the diversion by the City of Worcester entitled the plaintiff to recover in an action of tort. The

Court also held that no objection as to venue could be raised, and that the action was properly brought in Massachusetts. This case clearly holds that a person not a resident of Massachusetts, with property in another State injured by a diversion of waters from an interstate stream, may recover damages therefor in an action of tort even though there is no statutory provision providing such remedy.

The Power Company is Not Foreclosed from Further Relief.

We do not contend that, by the payment to the Northern Connecticut Power Company of the $80,000 damages which the Special Master has found it will suffer, the company is foreclosed from proceeding to collect under the Massachusetts statutes any further damage which it may feel that it has suffered. The power company is, of course, not a party to this proceeding and the only effect that the payment of $80,000 to it by Massachusetts would have would be as a payment *on account* of any damages which it might recover either by settlement with the Commission or by petition for the assessment of damages under the Massachusetts statutes.

The Northern Connecticut Power Company, therefore, has a complete and adequate remedy at law which should amply compensate it for whatever loss it may sustain. It is submitted that the conditional form of the decree suggested by the Special Master (Rep. Sp. M. 21, 54) is entirely proper. If this Court shall find that he was correct in his determination that the compensation at law for the injury to power in Connecticut is adequate, then the requirement that Massachusetts pay to the owners of the proposed power redevelopment the sum of $80,000 when that development is started is, from the standpoint of Massachusetts, entirely unobjectionable. Massachusetts,

in carrying out this project, has by its legislation declared its intention of paying for all injury, capable of ascertainment in accordance with established legal principles, which the project may cause. The fact that the injury will not be immediately suffered, should, under the principle of the cases cited by the Special Master (Rep. Sp. M. 21), be sufficient in and of itself to cause this Court to deny an injunction (*New York* v. *Illinois*, 274 U.S. 488; *New Jersey* v. *Sargent*, 269 U.S. 328, 338, 339). None the less it is equitable that Massachusetts should pay for an injury to a potential development at the time—in the future—when that injury is actually suffered, and the suggested condition in the recommended decree dismissing the bill seems a fair method of protecting the interests of all persons.

The Connecticut Exceptions as to Power.

It is submitted that the Connecticut exceptions numbered 39 and 40 (Conn. Exc. pp. 17-19) are disposed of by the evidence, to which reference has been made just above, for it is apparent that the findings of fact of the Special Master were strictly in accordance with the evidence. Exception numbered 41 does not contain a fair statement of the Special Master's action. He found that no damage would be caused to the present power plant at or near King's Island; he stated that only one power redevelopment was shown by the evidence to be possible on the Connecticut River in Connecticut; and he made express findings as to the amount of damage in dollars which would be caused by the Massachusetts project to that redevelopment if the redevelopment was ever carried out. The Special Master was not under any duty to find as suggested in exception numbered 41 and, although there is no indication that he refused to do so, it is hard to see how the exception is material.

Exceptions numbered 45 and 46 (Conn. Exc. p. 20) are disposed of conclusively by the finding that no damage is

caused to any present power development. These exceptions and exceptions numbered 42, 43, and 45 all are without merit because of the doctrine of law (see Rep. Sp. M. 7 *et seq.*; see *infra*, this brief, part III), referred to by the Special Master as the principle of "equality of right," applied by this Court in cases under its original jurisdiction involving the use of water of interstate streams by the *quasi*-sovereign States through which such streams flow. It seems clear that the decisions of this Court, in cases like *Kansas* v. *Colorado*, 206 U.S. 46, 97, *et seq.*, clearly establish the right of each riparian State to make a definite appropriation of an equitable division of the waters of an interstate stream. So long as Massachusetts has appropriated less than what is, under all the circumstances, an equitable division of the waters of the Connecticut River Valley (arising within the borders of Massachusetts), neither the State of Connecticut nor owners of property in Connecticut have any just basis for complaint about the Massachusetts project. In determining what constitutes an equitable division of such interstate waters, this Court gives attention to a comparison of the damage to a complainant State which would be caused by denying an injunction and that which would be caused to a defendant State by allowing an injunction (see, especially, *Kansas* v. *Colorado*, 206 U.S. 46, 100 *et seq.*).

If this is done in the case at bar, the damage to a future power development (which can be paid for fully in money) will be found to be trivial as compared with the damage to Massachusetts which would be caused by an injunction.

Two other principles of equity are applicable to this phase of the case. The first is the fundamental doctrine governing this case: The doctrine that this Court will not give one State relief in equity against another except for present damages of great magnitude clearly proved. Damages of $80,000 to a purely prospective project are not of great magnitude, particularly where money damages af-

ford full compensation. The second doctrine is the elementary equitable doctrine that, where money damages at law are entirely adequate, specific relief will be denied. The doctrine reinforces the principle that this Court will grant relief only where damage of serious magnitude is proved.

If Connecticut's exceptions numbered 42 to 46 (Conn. Exc. pp. 19-20) are based on the theory that she is protecting the interests of the Northern Connecticut Power Company, there is no merit in them, for it is well settled that this Court will not grant equitable relief to one State against another where the complainant State is suing purely on behalf of its individual inhabitants. The interest sought to be protected by the complainant State, must, of course, be an interest so general in its scope that its protection is a duty of the complainant State as *parens patriae*.

> See *North Dakota* v. *Minnesota*, 263 U.S. 365, at page 375 *et seq.*

It is submitted that no such damage to Connecticut power has been shown as would lead this Court to grant Connecticut any relief in equity.

5. Fish Life in the Connecticut River will Not be Affected by the Massachusetts Project.

The Special Master found (Rep. Sp. M. 22) "that the lowering of flood water resulting from proposed diversions is not shown to be materially injurious to the shad run." The Connecticut exception (Exc. No. 57, p. 26) taken to this finding was based upon the contention that the Special Master should also have found that there are a number of days in each summer when the river flow is so low that the pollution of the river at the state line is sufficiently great to make it likely that fish like shad would either migrate or die, and that any quantity of water taken out of the river

would be detrimental. It is submitted that any objection upon these grounds to the finding of the Special Master is immaterial in this case in view of the evidence which shows that, at all the periods when the river has been shown to be approaching a critical state from the standpoint of pollution, there would have been more water flowing in the river at the state line if the Massachusetts project had been in effect, than if the project had not been in effect. This evidence has been referred to adequately above in discussing the general subject of pollution. The evidence upon this point in detail was as follows (see Joint Sum. p. 151 *et seq.*):

Dr. Rudolfs, a witness for Connecticut, testified as to the pollution content of the river at the state line (Joint Sum. p. 108; Transcript, p. 470). He also testified that there was a great improvement in the state of the river between the state line and a point just above Hartford (Joint Sum. p. 115; Transcript, p. 548). Massachusetts expert witnesses testified (Joint Sum. pp. 132, 125; Transcript, p. 1490; see p. 1393) that the river was in a better state below Hartford (at Rocky Hill) than at the state line. It appears in evidence (Joint Sum. p. 153; Transcript, p. 966) that the shad never go above the Enfield dam, several miles below the state line. Dr. Rudolfs also testified (Joint Sum. p. 156; Transcript, p. 446) that the effect of pollution upon fish life depended upon the dissolved oxygen content of the water of the river (not upon the oxygen balance—Joint Sum. p. 156; Transcript, p. 447). He testified that the Connecticut River at the state line was just on the border line (Joint Sum. p. 156; Transcript, p. 470). It appeared that the Connecticut pollution tests took place during the summer and fall seasons of 1928 and 1929—periods of low flow (Transcript, pp. 418, 471) [*i.e.*, from June, 1928, to November, 1928, and from July, 1929, to September]. Dr. Rudolfs' conclusions were based, therefore, upon observations during the driest seasons of

the year, apparently comparatively unimportant from the standpoint of the shad which come into the river on the spring freshets. Not only were his observations during a more limited period than those of the Massachusetts experts (Joint Sum. p. 120 *et seq.*; see Transcript, pp. 730, 736, 738, 1387), but the Massachusetts analyses of the pollution state of the river at the state line revealed a larger dissolved oxygen content than was found by Dr. Rudolfs (see Joint Sum. pp. 124, 128; Transcript, pp. 1392, 1406, 1407, Exhibit D-8). The lowest dissolved oxygen content of the river at the state line found in any sample taken by Massachusetts was 3.75 parts per million gallons, equivalent to 44% oxygen saturation, found on September 8, 1929. The average content for the week (September 5-13, 1929, inclusive) was 4.70 parts per million or 53% saturation (Joint Sum. p. 130; Transcript, p. 1414). On September 8, 1929, under the War Department findings water would have been released from the Swift River Reservoir in excess of the natural flow in the Swift River at the point of diversion (Joint Sum. p. 130; Transcript, p. 1414, Exhibit C-12*a*); so the Massachusetts project, had it been in effect on that day, would have been an aid and benefit to the river at the state line rather than a detriment. Dr. Rudolfs testified that the amount of oxygen required for fish life (with special reference to shad) was a minimum of 3.5 to 4 parts per million, and that if the oxygen got below that amount, the fish began to migrate (Joint Sum. p. 102; Transcript, p. 435). According to Dr. Rudolfs' own figures the lowest weekly average oxygen content at the state line was 3.58 (Transcript, p. 448). During this week (August 25-31, 1929) the Massachusetts project, if in effect in accordance with the War Department findings, would have resulted in an increase in the natural flow of the Connecticut River at the state line. In view of the improvement in the river before it reaches Hartford, already referred to (Joint Sum. p. 115;

Transcript, p. 548), it is hard to see how, even upon Connecticut's own testimony, fish life is threatened by the Massachusetts project.

The Special Master was well warranted in finding as he did (Rep. Sp. M. 22, middle) that the evidence did not prove in any way that the number of shad caught varied directly with the height of the spring floods. Exhibits introduced both by the complainant (Exhibit C-29, C-30) and by the defendant (Exhibit C-29*a*) lead, as the Special Master said they do, to the inference that the variation in shad catch is due largely to other elements than the mere height of floods (as Connecticut endeavored to prove).

Massachusetts contends, therefore, that the Special Master was plainly correct in his determination that the Ware-Swift project as modified by the War Department findings would cause no ascertainable present damage to the State of Connecticut or its inhabitants, and further that the only future damage which might be caused by the project, that is, the damage to the proposed power redevelopment, could be paid for adequately by way of compensation in money.

II. The Action of the Secretary of War and the Chief of Engineers upon the Applications for the Approval of the Contemplated Diversions Constituted a Proper Performance of the Duties Delegated to Them by the Act of Congress of March 3, 1899. That Action, by Deciding that the Diversion is Not Objectionable (within the Limits Specified in the War Department Findings) so Far as Navigation is Concerned, Forecloses any Contention of Connecticut that the Diversion will Injure Navigation.

The argument of Massachusetts upon this branch of the case may be summarized as follows:

A. Congress under the Constitution has full power to authorize diversions such as those in the present case, and its determination with respect to such diversions is final.

B. Congress can properly delegate to the Secretary of War and to the Chief of Engineers this power to determine whether diversions such as those in the case at bar affect navigation. It has done so by the Act of March 3, 1899.

C. The Secretary of War, upon recommendation of the Chief of Engineers, has validly authorized the Ware and Swift River diversions with certain limitations and restrictions.

D. With reference to all questions as to the effect of the Massachusetts project upon navigation, the action of the Secretary of War is as conclusive and final as the action of Congress would have been, inasmuch as the Secretary acted in good faith and conformed to all statutory requirements and conditions.

A. Congress under the Constitution has Full Power to Authorize Diversions Such as Those in the Present Case, and Its Determination with Respect to Such Diversions is Final.

The power of Congress to control navigable waters is derived from article I, section 8, clause 3, of the Constitution of the United States, which confers upon Congress the right to regulate interstate and foreign commerce. This Court has said: "The right of the United States in the navigable waters within the several states is limited to the control thereof for the purpose of navigation."

Port of Seattle v. *Oregon Railroad Co.*, 255 U.S. 56, 63.

United States v. *Chandler-Dunbar Co.*, 229 U.S. 53, 62, *et seq.*

Massachusetts makes no contention that the power of Congress in navigable waters goes beyond the subject of navigation. Congress, by the Acts of September 19, 1890, and March 3, 1899, has assumed complete jurisdiction of everything pertaining to navigation.

> *Southern Pacific Co.* v. *Olympian Dredging Co.*, 260 U.S. 205, 207-208.
> *Sanitary District* v. *United States*, 266 U.S. 405, 425-426, 428-429.

Nothing is left to the States with respect to this power, for it is definitely settled by this Court that where Congress enters a field originally common to Federal and State law, and covers that field completely, all State action within that field is excluded (see Rep. Sp. M. 15).

> *Sherlock* v. *Alling*, 93 U.S. 99.
> *Chicago, R.I. & P. R. Co.* v. *Hardwick Farmers Elevator Co.*, 226 U.S. 426.
> *Missouri Pac. R. Co.* v. *Stroud*, 267 U.S. 404.

Not only are the States excluded from regulation within the field of navigation after Congress has spoken, but this Court has said that it will not revise a determination of fact by Congress within that field. If Congress makes a determination as to the effect of a given project or structure upon navigation, the Courts will not review or alter that determination.

In *Monongahela Bridge Co.* v. *United States*, 216 U.S. 177, at page 195, the Court said:

> "It is for Congress, under the Constitution, to regulate the right of navigation by all appropriate means, to declare what is necessary to be done in order to free navigation from obstruction, and to prescribe the way in which the question of obstruction shall be determined. Its action in the premises cannot be re-

vised or ignored by the courts or by juries except that when it provides for an investigation of the facts, upon notice and after hearing, before final action is taken, the courts can see to it that executive officers conform their action to the mode prescribed by Congress."

In *United States* v. *Chandler-Dunbar Co.*, 229 U.S. 53, at page 64, the Court said:

"So unfettered is this control of Congress over the navigable streams of the country that its judgment as to whether a construction in or over such a river is or is not an obstacle and a hindrance to navigation is conclusive. Such judgment and determination is the exercise of legislative power in respect of a subject wholly within its control."

These authorities conclusively establish that Congress has plenary power as to the regulation of navigation, and that its action in determining whether a given project constitutes an obstruction to navigation is final and non-reviewable.

B. Congress can Properly Delegate to the Secretary of War and to the Chief of Engineers this Power to Determine whether Diversions Such as Those in the Case at Bar Affect Navigation. It has Done so by the Act of March 3, 1899.

Sections 9 and 10 of the Act of March 3, 1899, 30 STAT. AT L. 1151 (U.S. Code, Tit. 33, §§ 401, 403), read as follows:

"SEC. 9. It shall not be lawful to construct or commence the construction of any bridge, dam, dike, or causeway over or in any port, roadstead, haven,

harbor, canal, navigable river, or other navigable water of the United States until the consent of Congress to the building of such structures shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of War; *Provided*, That such structures may be built under authority of the legislature of a State across rivers and other waterways the navigable portions of which lie wholly within the limits of a single State, provided the location and plans thereof are submitted to and approved by the Chief of Engineers and by the Secretary of War before construction is commenced: *And provided further*, That when plans for any bridge or other structure have been approved by the Chief of Engineers and by the Secretary of War, it shall not be lawful to deviate from such plans either before or after completion of the structure unless the modification of said plans has previously been submitted to and received the approval of the Chief of Engineers and of the Secretary of War.

"SEC. 10. The creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner *to alter or modify* the course, location, condition, or *capacity of*, any port, roadstead, haven, harbor, canal, lake, harbor of refuge,

or inclosure within the limits of any breakwater, *or of the channel of any navigable water of the United States*, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same." (Italics ours.)

The Wisconsin Case.

The precise nature of the authority and duty delegated by Congress in these sections was recently considered by this Honorable Court in—

Wisconsin v. *Illinois and Sanitary District*, 278 U.S. 367, 412-413—

where it was said:

"The policy carried out in the Act of March 3 1899, had been begun in the Act of September 19, 1890, c. 907; 26 Stat. 426, 454, 455. Sections 9 and 10 were the rearranged result of the provisions of Sections 7 and 10 of the Act of 1890. A new classification was made in Sections 9 and 10 of the Act of 1899, and substituted for Section 10 of the Act of 1890. The latter provided that the creation of any obstruction to navigable capacity was prohibited, unless 'affirmatively authorized by law' and this was changed so as to read 'affirmatively authorized by Congress.' The change in the words of the first clause of Section 10 was intended to make mere State authorization inadequate. *Sanitary District* v. *United States*, 266 U. S. 405, 429; *United States* v. *Bellingham Bay Boom Co.*, 176 U. S. 211. It was not intended to override the authority of the State to put its veto upon the placing of obstructing structures in navigable waters within a State and both State and Federal approval were made necessary in such case. *Cummings* v. *Chicago*, 188 U. S.

410. The words 'affirmatively authorized by Congress' should be construed in the light of the administrative exigencies which prompted the delegation of authority in the succeeding clauses. Congress, having stated in Section 9 as to what particular structures its specific consent should be required, intended to leave to the Secretary of War, acting on the recommendation of the Chief of Engineers, the determination of what should be approved and authorized in the classes of cases described in the second and third clauses of Section 10. If the section were construed to require a special authorization by Congress whenever in any aspect it might be considered that there was an obstruction to navigable capacity, none of the undertakings specifically provided for in the second and third clauses of Section 10 could safely be undertaken without a special authorization of Congress. *We do not think this was intended.* [Italics ours.] The Supreme Court of Maine in *Maine Water Co. v. Knickerbocker Steam Towage Co.*, 99 Me. 473, took the same general view in construction of the same section. It held that the broad words of the first clause of that section were not intended to limit the second and third clauses and that Congress's purpose was a direct prohibition of what was forbidden by them except when affirmatively approved by the Chief of Engineers and the Secretary of War. We concur in this view.

"The true intent of the Act of Congress was that unreasonable obstructions to navigation and navigable capacity were to be prohibited, and in the cases described in the second and third clauses of Section 10, the Secretary of War, acting on the recommendation of the Chief of Engineers, was authorized to determine what in the particular cases constituted an unreasonable obstruction."

Contemporary Construction of Section 10.

The Court (at p. 413) then adverts to and approves the contemporary construction of section 10 by the War Department, especially as revealed by the Opinion of the Acting Attorney General to the Secretary of War (February 13, 1925), 34 Op. Atty. Gen. 410, 416, where the Acting Attorney General says:

> "In my opinion Congress thus intended to delegate to the Chief of Engineers and the Secretary of War an administrative authority to determine a fact; and if they were of opinion that the use of navigable waters in a certain case was not such an impairment of their navigability as to require the prohibition of Congress, then the construction was 'affirmatively authorized by Congress,' because the administrative agency to which Congress had delegated the ascertainment of the facts had found the fact to be that such use was not for the time being an impairment of navigable capacity such as Congress intended to prohibit.
>
> "I am informed that for a long period of years it has been the practice of the War Department to issue permits under section 10 of the Act of March 3, 1899, without requiring that the particular project be first authorized by special Act of Congress, and that was the policy of the War Department in the specific case of the Sanitary District of Chicago."

The following language of the opinion in *Wisconsin* v. *Illinois and Sanitary District* shows that the Court clearly had in mind the precise nature of the determination of fact thus left by Congress to the Secretary of War and to the Chief of Engineers (at p. 414):

> "But it is said the construction thus favored would constitute it a delegation by Congress of legislative power and invalid. We do not think so. The deter-

mination of the amount that could be safely taken from the Lake is one that is shown by the evidence to be a peculiarly expert question. It is such a question as this that is naturally within the executive function that can be deputed by Congress. . . .

"The construction of Section 10 of the Act of March 3, 1899, was settled by this Court in the decision of the first Chicago Drainage Canal case in 266 U. S. 405, 429. The decision there reached and the decree entered can not be sustained, except on the theory that the Court decided first that Congress had exercised the power to prevent injury to the navigability of Lake Michigan and the other lakes and rivers in the Great Lakes watershed, and second that it could properly and validly confer the administrative function of passing on the issue of unlawful injury or otherwise on the Secretary of War, and that it had done so."

Summary of the Wisconsin Case:

Such is this Court's most recent construction of the power and duty confided to the Secretary of War and to the Chief of Engineers by section 10. Briefly, it may be summarized:

1. Congress, by section 10, has declared its decision that no unreasonable obstruction to navigable capacity shall be permitted unless Congress has affirmatively authorized it either directly or through the War Department.

2. Actual assent by Congress itself is necessary to projects covered by section 9. [In the case at bar it appears that the only dam or other storage reservoir to be constructed by Massachusetts as part of the project will be in the valley of the Swift River, which is in no sense a navigable water of the United States. The Connecticut River itself is not alleged to be navigable above Springfield (Bill, par. 6, p. 4). There is obviously no necessity of action by Congress itself under section 9 in order that

approval of the erection of a reservoir in the valley of the Swift River may be obtained.]

3. Congress, by section 10, has delegated to the Secretary of War and to the Chief of Engineers the duty of determining whether any other project [having the necessary or probable result of doing one of the acts mentioned in the second and third clauses of section 10] is reasonable or unreasonable so far as concerns the public interest in the maintenance of navigation for the protection of interstate and foreign commerce. A determination by the Secretary that a project is reasonable constitutes an affirmative authorization by Congress.

We submit that it cannot successfully be maintained that the authority given by the second and third clauses of section 10 to the Secretary of War and to the Chief of Engineers does not include the power to determine the propriety of diversions from non-navigable tributaries of navigable waters. The third clause of section 10 (see *supra*, pp. 78-79) reads, in part:

> "And it shall not be lawful . . . in any manner to alter or modify the . . . capacity . . . of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

These words are broad and inclusive in meaning, and they have been liberally construed to include affecting by diversions the navigable capacity of a navigable water, as in the *Chicago Drainage Canal* cases (see 34 Op. Atty. Gen. 410, 416). It is obvious that a diversion from a non-navigable tributary of a navigable water may have fully as great an effect upon the navigable capacity of that water as a direct diversion from that water itself.

> *United States* v. *Rio Grande &c. Co.*, 174 U.S. 690, 708.

The purpose of Congress in making the prohibition contained in the first clause of section 10 would require the Secretary's authorization, not only of a direct diversion from a navigable water, but of an indirect diversion as well.

C. The Secretary of War, upon Recommendation of the Chief of Engineers, has Validly Authorized the Ware and Swift River Diversions with Certain Limitations and Restrictions.

The Secretary of War, in granting approval or authorization of any of the acts enumerated in section 10 (and a diversion has always been treated as being included within this section), need not find that the project before him will constitute an affirmative aid to navigation. If he does so find, obviously he may properly authorize the project. His power to authorize a project is equally clear in a case where he finds that, although the project does not aid navigation, it will do no injury to navigation. The Secretary should withhold his authorization only if the project in his opinion, after investigation and hearing, will unreasonably interfere with navigation or navigable capacity. His action, in a case where he finds that a contemplated project will not injure navigation, really constitutes a waiver of objections on the part of the Federal government.

The *motive* or *purpose* of the project under consideration is utterly immaterial. The only question before the Secretary of War is the effect upon navigation or navigable capacity. The Secretary may not authorize or refuse to authorize diversions on the ground that he approves or disapproves of the purposes or motives of the person engaging in such project. His duty is to examine the project carefully, and to prevent it only if he finds that it will constitute an unreasonable obstruction or injury to navigation. When the Secretary, under section

10, authorizes a project, the validity of his authorization does not depend upon the fact that the project will aid in irrigating arid lands, in carrying off sewage, or in supplying a community with water for domestic purposes, or upon the fact that it will produce beneficial results in any other respect. The validity of his determination is derived solely from the fact that he finds that no injury to navigation will result.

Certain of the complainant's exceptions, notably exceptions 26, 27, 32, and 33 (Conn. Exc. pp. 15-17), disregard entirely the fact that the purpose of section 10 is to prevent injury and obstruction to navigation, and to require every person or State about to engage in any of the enterprises described in the section (which may or may not affect navigation) first to obtain from the Secretary of War [for this purpose the duly constituted agent of the Congress of the United States] a determination that the project will have no adverse effect on navigation. It is submitted that these exceptions are disposed of by the argument which has just been made.

The Massachusetts Project is an Affirmative Aid to Navigation.

Even if this Court should hold that the Secretary of War has no power to authorize a project unless it constitutes an affirmative aid to navigation, the evidence in the case and the findings of the Special Master clearly show that the diversions as modified and limited by the Secretary's orders (which are binding upon Massachusetts) actually do constitute such an affirmative aid. On page 17 of his report the Special Master said:

> "Moreover it is to be noted that the works authorized are to a certain extent in direct aid of navigation. The testimony shows that the critical period of navigation is during extreme low water, and the Secre-

tary's permit is on condition that water be added to the stream during that period. The proof shows that from 1913 to 1929, inclusive, the Swift river reservoir, operated as required by the Secretary, would have increased the flow of the Connecticut 43.5 days during each year on the average, the number of days varying from 110 in 1913 to zero in 1922 and 1928, the last two being years of unusually high water."

On page 18 of his report the Special Master states further:

"The discharge required from the Swift river reservoir during low water periods will somewhat benefit navigation. I cannot see how the diversion can injure navigation and, therefore, find that the proposed diversions will not interfere perceptibly or materially with the navigation on the Connecticut."

This aspect of the case has been treated earlier in this brief at some length, and no useful purpose would be served by repeating that discussion.

Action of the Chief of Engineers and of the Secretary of War with Reference to Diversions of Ware and Swift Rivers.

The action of the Secretary of War and of the Chief of Engineers upon the applications made to the diversions here in issue is fully set out in pages 81 to 102 of reprint of the Massachusetts Answer.

The Ware River Finding.

As to the Ware River diversion, paragraphs 5 and 6 of the recommendation of the Chief of Engineers (Reprint of Answer, p. 86), approved by the Secretary of War on March 14, 1928, show that full hearings were given, and

that the State of Connecticut and others interested presented arguments in writing and orally, setting forth their objections to the project.

Paragraph 9 reads as follows:

> "9. The applicant is very desirous of a decision concerning the Ware River application as soon as possible. So far as the interests committed to this department are concerned, I see no reason for deferring action in the case. In my opinion the proposed diversion of waters in excess of 85,000,000 gallons per day (131 cubic feet) *will have no adverse effect on the navigable capacity of the Connecticut River.* In view of the controversy before the Supreme Court, it seems inadvisable to issue a formal permit for the present, but to inform the applicant that no objection will be imposed by the War Department to the diversion of the flood waters exceeding 85,000,000 gallons per day for the period October 15 to June 15 of each year. Approval of this course of action is recommended." (Italics ours.)

This action of the Secretary of War somewhat limited the diversion as authorized by the Massachusetts legislation, in that it prohibited any diversion whatever between June 15 and October 15, whereas the Massachusetts Legislature permitted diversions even between May 31 and December 1, provided the assent of the Massachusetts Department of Public Health was procured (Mass. St., 1926, c. 375, § 1).

The statement of the Secretary of War that no objection will be interposed by the War Department to the diversion of the flood waters exceeding 85 million gallons per day for the period October 15 to June 15 of each year constitutes an entirely valid action by the Secretary of War under section 10 of the Act of March 3, 1899. The statement that no formal permit should issue at the present time

because of the pending controversy before this Court in no way lessens the force or validity of the Secretary's finding. The procedure was in exact conformity with the statute. Application was made on November 30, 1927, by the Metropolitan District Water Supply Commission (Reprint of Answer, p. 81). Hearings were held and written and oral objections presented by Connecticut and other interested parties. After considerable study and investigation, the Chief of Engineers on March 6, 1928, made a report to the Secretary of War, which report contained definite recommendations as to the course of action to be pursued. The Secretary, on the 14th day of March, 1928, approved these recommendations. On March 19, 1928, the Commonwealth of Massachusetts was notified by the War Department of the action taken. The Special Master (Rep. Sp. M. 13, 14-17) ruled that the order was equivalent to consent by the Secretary to the diversions, and that the fact that it was negative in form does not in any way lessen or affect its conclusive force.

The finding of the Secretary, after a long and detailed study of a complicated engineering situation, should not be construed as an idle gesture or as a futile order in the nature of gratuitous advice. The only basis or justification for action by him in the premises is found in section 10, and the reasonable construction of his action and that of the Chief of Engineers is that they both intended to perform, and were performing, their functions and powers under that section. If the action of the Secretary and Chief of Engineers was not official action under section 10, then the carefully worked out limitations and modifications of the Massachusetts project would be meaningless and of no significance. The granting of a formal permit could add nothing to the force of the action of the Secretary, for the reason that his approval was a full exercise of his duty and power under this section. It follows, as the Special Master has stated, that the finding is as completely valid

and conclusive as if it had been in the form of an affirmative license (Rep. Sp. M. 13, 14-17).

The Swift River Finding.

As to the Swift River diversion, paragraph 11 of the recommendation of the Chief of Engineers (Reprint of Answer, pp. 98-100) states that the War Department is unwilling to admit that the appropriation of water from the Swift River to the extent *proposed in the application of Massachusetts* might not, on occasion, have an appreciable effect on the navigable capacity of the Connecticut River. The Chief of Engineers finds definitely, however, that the diversion will cause no substantial alteration or modification of the condition or navigable capacity of the navigable portion of the Connecticut River, if the flow of water in the Swift River *as authorized by the Massachusetts legislation* be augmented during the critical period from June 1 to November 30, in each year, in accordance with the provisions of his findings. [These conditions have been set out above in the general statement of the case.]

This recommendation, dated May 10, 1929, was approved by the Secretary of War on May 11, 1929. The application of the Metropolitan District Water Supply Commission was dated November 30, 1927. A considerable period of time thus elapsed between the application and the approval of the War Department. Paragraphs 6 and 7 of the recommendations of the Chief of Engineers (Reprint of Answer, pp. 96-97) indicate that the application was studied in great detail for seventeen months, and that full opportunity was given to the State of Connecticut and other interested parties to present objections. It is clear that the action of the Chief of Engineers and the Secretary upon the Swift River application has the same legal significance as their action upon the Ware River diversion. The contentions of Massachusetts, already made with reference to the Ware River, apply with equal

force to the action of the War Department on the Swift River.

Comments on Connecticut's Exceptions as to the Law on Navigation.

Several Connecticut exceptions require special comment. *Exception No. 26* (Conn. Exc. p. 15) is based upon a misconception of the purpose of section 10 of the Act of 1899. It is immaterial, in so far as the Secretary's duty is concerned, whether the water is diverted into another watershed or not. The only issue before him is whether or not an obstruction or injury to navigation will be created by the diversion proposed.

Exceptions Nos. 29, 30, 31, 33, 34, and 35 (Conn. Exc. pp. 15-17). These exceptions rest upon some theory that Massachusetts requires the permission, not only of the War Department, but also of Congress under sections 9 and 10 of the Act of March 3, 1899, before erecting a dam in the valley of the non-navigable Swift River, and that detailed plans of the physical structures involved in the Massachusetts project must be submitted to the War Department for approval. Such a contention, pushed to its logical conclusion, would require the consent of Congress [and an approval of all plans] before the smallest mill-dam could be built on the smallest stream, if that stream flowed eventually into a navigable river. The plain words of section 9 ("any . . . dam, dike . . . in any . . . *navigable river or other navigable water*") and of section 10 ("or other structure in any . . . navigable river, or other water of the United States outside established harbor lines") indicate beyond any doubt that Congress intended to regulate only the erection of structures actually placed in the *navigable* portions of *navigable* streams—and in no way intended to do what it has probably no constitutional power to do, *i.e.*, to regulate in detail the construction of works in non-navigable streams. If there were

any room for doubt as to the meaning of sections 9 and 10, we submit that this Court should adopt (as between a statutory construction which raises strong doubts as to the constitutionality of an act of Congress and another construction which renders the statute unquestionably valid) the construction which leaves no room for any holding or argument that the legislative department has exceeded its powers.

Richmond Screw Anchor Co. v. *United States*, 275 U.S. 331, 346.
Blodgett v. *Holden*, 275 U.S. 142, 148.

This Court has made it clear that section 9 would be construed to apply only to the specific structures therein mentioned.

Wisconsin v. *Illinois*, 278 U.S. 367, 412-413.

No structures in non-navigable streams are mentioned in section 9, so it is certain that no authorization by act of Congress is necessary before Massachusetts or any riparian owner can build a dam in the non-navigable Swift River. We submit that it is equally certain that the second clause of section 10 applies only to structures actually placed in navigable waters of the United States and that the section does not apply to any structure in a non-navigable stream, for it is, of course, true that the construction of a dam in a non-navigable stream in and of itself has no necessary effect upon the navigable capacity of any navigable water into which the non-navigable stream may flow. For that reason there is no basis for Congressional control of the *erection* of dams in *non*-navigable waters. The *use* of such dams in such a way as to create an obstruction to the navigable capacity of any navigable water of the United States is, of course, subject to the Congressional control, which has been delegated by section 10 to the Secretary of War and to the Chief of Engineers.

Paragraph 5 of the recommendations of the Chief of Engineers on the Swift River application, approved by the Secretary of War May 11, 1929 (Reprint of Answer, p. 96), reads:

> "5. No permit is required for any of the diversion structures, as the Swift River and its various branches, as well as Beaver Brook, are non-navigable streams. The jurisdiction of the War Department in cases of this kind begins when the appropriation or regulation of the waters of a non-navigable tributary is of such extent as 'to alter or modify the . . . condition or capacity of . . . the channel of any navigable water of the United States.' Since such alteration or modification, without previous recommendation and authorization of the Chief of Engineers and the Secretary of War, is unlawful, the War Department is interested in determining whether the amount of such appropriation or regulation would probably demand institution of Federal proceedings to preserve substantially the navigability of navigable waters."

It thus may be seen that the Secretary himself recognizes that no permit is required for the structures, either in the Swift or Ware Rivers.

D. With Reference to All Questions as to the Effect of the Massachusetts Project upon Navigation the Action of the Secretary of War is as Conclusive and Final as the Action of Congress would Have Been, inasmuch as the Secretary Acted in Good Faith and Conformed to All Statutory Requirements and Conditions.

So far as concerns the question of navigation, the action of the Secretary of War is as conclusive and final as that of Congress, provided the Secretary acts in good faith and conforms to all statutory requirements and conditions. In

Monongahela Bridge Co. v. *United States*, 216 U.S. 177, at page 195, the Court said:

> "It was not for the jury to weigh the evidence and determine according to *their* judgment, as to what the necessities of navigation required, or whether the bridge was an unreasonable obstruction. The jury might have differed from the Secretary. That was immaterial; for Congress intended by its legislation to give the same force and effect to the decision of the Secretary of War that would have been accorded to direct action by it on the subject."

The original report of the Special Master in the case of *Wisconsin* v. *Illinois* contains, on pages 161 to 165, a comprehensive review of the cases on this subject. The Special Master in that case (the present Chief Justice) stated, on page 164 of his report:

> "The question whether such an abstraction should be altogether prohibited, or the extent to which it should be permitted with regard to the interests of navigation, when and in what circumstances and in what amount a diversion of water from the lake would constitute an obstruction to navigation, are questions within the power of Congress to decide in the exercise of its control over navigable waters for the purposes of navigation. When these questions have been determined by Congress, *or under its authority validly conferred* [italics ours], they are not open to reconsideration by the Court."

The decision by this Court in the *Wisconsin* case in no way alters this rule. It is, of course, true that the Secretary may not authorize a project that will unreasonably obstruct or impair navigation. His duty, as stated by the Court, is to preserve, not to destroy, navigation; but as the report of Hon. *C. W. Bunn*, the Special Master in the case

at bar, points out (Rep. Sp. M. 15), the various "secretaries who granted the permits for diversion at *Chicago* never found that the diversion would not affect navigation," but "recognized that the diversion would damage navigation." The permits in the *Chicago* case were at most temporary, in view of pending litigation, and were, in part at least, caused by the action of Chicago in disregarding the terms of prior permits for diversions which would not have damaged navigation at the time when the permits for them were issued. This Court, in the *Chicago Drainage* case, 278 U.S. 367, held that the Secretary did not have the right to authorize or permit diversions of water *needed for navigation* merely for the purpose of carrying off the sewage of the City of Chicago, and, inasmuch as the Court found that the situation requiring the temporary permit was produced by the inequitable conduct of the Sanitary District, it ordered that District to put a stop to the situation which required the permit. It is submitted that the *Chicago Drainage* decision does not in any way weaken the contention that the determination of the Secretary of War to the effect that a given project will not hinder navigation is final and conclusive. The decision merely establishes the rule that the Secretary may not permit or authorize a diversion if he recognizes that it will cause a substantial impairment of navigation. It is to be noted that the Court does not attempt to review the Secretary's determination of the issue of fact properly before him but lays down the principle that he must not in any event authorize or permit a diversion which *admittedly* causes a substantial damage to navigation.

There is nothing in *Ford & Son* v. *Little Falls Co.*, 280 U.S. 369, which tends to contradict the contentions we have made. That decision, construing the analogous powers of the Federal Water Power Commission, turned entirely upon the construction of the different statutes there under consideration.

It is submitted that it is well settled that the decision of the War Department is fully as conclusive of the issue of obstruction or injury to navigation, when that decision is attacked collaterally, as in proceedings to which the United States is a party. [It should be remembered that in the case at bar this Court (279 U.S. 821) declined to join the Secretary of War as a defendant, and by that refusal refrained from reviewing the Secretary's determination directly.]

This is certainly true when the existence of an obstruction to navigation becomes of importance in litigation as between private parties.

> *Southern Pacific Co.* v. *Olympian Dredging Co.*, 260 U.S. 205, 207-208, 209-210, and cases cited.

We contend that no different rule applies when the determination of the War Department that no obstruction to navigation exists in any particular instance is raised in the course of litigation before this Honorable Court, within its original jurisdiction.

In *Kansas* v. *Colorado*, 206 U.S. 46, 85 *et seq.*, this Honorable Court, in considering the nature of its original jurisdiction as between States, took a distinction as between the method of determining issues over which the Federal government had controlling power and the method of determining other justiciable issues between the States as to which this Court as a *quasi*-international tribunal had final power. So far as the issues in the case were subject to national control, the Court intimated that the action, if any, of the Federal government within its proper constitutional sphere would be treated as of primary importance as governing the national phases of the situation.

> "Is the question one solely between the States or is the matter subject to national legislative regula-

tion, and, if the latter, to what extent has that regulation been carried? Clearly this controversy is one of a justiciable nature. The right to the flow of a stream was one recognized at common law, for a trespass upon which a cause of action existed.

"The primary question is, of course, of national control. For, if the Nation has a right to regulate the flow of the waters, we must inquire what it has done in the way of regulation. If it has done nothing the further question will then arise, what are the respective rights of the two States in the absence of national regulation? Congress has, by virtue of the grant to it of power to regulate commerce 'among the several States', extensive control over the highways, natural or artificial, upon which such commerce may be carried. It may prevent or remove obstructions in the natural waterways and preserve the navigability of those ways. In *United States* v. *Rio Grande Irrigation Company*, 174 U.S. 690, in which was considered the validity of the appropriation of the water of a stream by virtue of local legislation, so far as such appropriation affected the navigability of the stream, we said (p. 703):

"'Although this power of changing the common law rule as to streams within its dominion undoubtedly belongs to each State, yet two limitations must be recognized: First, that in the absence of specific authority from Congress a State cannot by its legislation destroy the right of the United States, as the owner of lands bordering on a stream, to the continued flow of its waters; so far at least as may be necessary for the beneficial uses of the Government property. Second, that it is limited by the superior power of the General Government to secure the uninterrupted navigability of all navigable streams within the limits of the United States.

"'In other words, the jurisdiction of the General Government over interstate commerce and its natural highways vests in that Government the right to take all needed measures to preserve the navigability of the navigable watercourses of the country even against any state action.'"

See also *Missouri* v. *Illinois*, 200 U.S. 496, 520.

We submit that the quoted reasoning in *Kansas* v. *Colorado* indicates that this Court, in the exercise of its original jurisdiction, would give effect to a determination by the appropriate department of the Federal government of an issue over which Congress had assumed to exercise the power delegated to it under the Constitution. In the case at bar, therefore, it would follow that the determination by Congress (through its properly created administrative agents in the War Department) that the proposed Ware and Swift diversions will not obstruct navigation should be regarded in this controversy as conclusive, so far as the issue of the effect of the diversions upon navigation is concerned.

Only the Navigability Issue is Concluded by the War Department Findings.

Massachusetts does not contend that this Court has not full jurisdiction to determine what the effect of the proposed diversions will be upon interests, other than interests of navigation, of the State of Connecticut and its citizens. Congress (and its administrative agents, the Secretary of War and the Chief of Engineers) has power to determine only what the effect of the proposed diversions will be upon navigation.

See *United States* v. *River Rouge Improvement Co.*, 269 U.S. 411, 419, and cases cited.

It by no means necessarily follows that a diversion which is innocuous so far as navigation is concerned may not cause damage to other important interests—*e.g.*, soil fertility, development of power, etc. We contend, however, that we have shown above that the Special Master was fully warranted in finding that the diversions contemplated will have no adverse effect upon any interest of the State of Connecticut either as a proprietor or as *parens patriae*, or upon the inhabitants of Connecticut.

III. The Special Master was Correct in Ruling that the Principle of "Equality of Right" Controlled the Use of the Connecticut River by the States through which it Flows. Massachusetts is Entitled to Make a Reasonable Use of the Waters of the Connecticut River, Including the Right to Appropriate Permanently an Equitable Portion of Its Waters.

Massachusetts contends that, under all the principles of law applicable to the case at bar, the use of the waters of the Ware and Swift Rivers proposed by it is altogether reasonable and proper. Where a stream flows through two States, two *quasi*-sovereigns have rights in that stream, to some extent absolute, to some extent qualified by the supreme Federal interest in the preservation of navigability, and to some extent modified by the equal rights of the other riparian State. It is submitted that each State is entitled to make a reasonable and equitable use of the benefits of the stream, not only by using the waters of the stream as they flow through its boundaries, but also by appropriating permanently a fair portion of the waters of the stream; provided always that the right of the other State to make a fair use of the stream and an appropriation of its equitable share of the waters of the stream is

not thereby impaired. The Special Master recognized this doctrine (Rep. Sp. M. 6-12) in his report.

Connecticut exceptions numbered 9 to 16, 21, and 22 [Conn. Exc. pp. 10-13] all contain some form of objection to the Special Master's rulings in this respect.

A. The Law Applicable to the Case at Bar is to be Determined by This Honorable Court in the Light of the Whole Situation of Fact; having Due Regard to the Decisions of this Court in Other Interstate Cases, to the Municipal Law in Force in Massachusetts and Connecticut, to Pertinent Provisions of International Law and Practices, and to the Customary Methods of Obtaining and Using Water in the Two States here Involved. No One of these Factors is All Important.

This Court has in past decisions indicated the basis upon which it will determine the principles of law applicable to a controversy such as this between two *quasi*-sovereign States. Apart from the issues of navigability, we submit that this Honorable Court should give some force and effect to each of the following factors:

1. Principles laid down by this Honorable Court in other interstate cases involving the use of interstate streams;

2. International and interstate practices and precedents as to the use of international and interstate streams;

3. The theory and the practical application of riparian and water law in the two contending States, particularly so far as domestic water supplies are concerned; as revealed not only by the decided cases, but also by the legislative policy of the States as expressed in general and special acts.

4. The necessity of expanding and developing the existing principle of international law giving a priority of right to make use of water for domestic purposes as compared to the use of the same water for other purposes.

The Right of a State to Sue as Parens Patriae.

It is not disputed by Massachusetts that Connecticut has a standing as *parens patriae* to raise for the determination of this Court issues (other than issues concerning navigability) with respect to the effect of the proposed Massachusetts diversions.

> *Kansas* v. *Colorado*, 185 U.S. 125, 141 *et seq.*; 206 U.S. 46, 80 *et seq.*
>
> *Missouri* v. *Illinois*, 180 U.S. 208, 241; 200 U.S. 496, 519.
>
> *New York* v. *New Jersey*, 256 U.S. 296, 302.
>
> *North Dakota* v. *Minnesota*, 263 U.S. 365, 372 *et seq.*
>
> *Wisconsin* v. *Illinois*, 278 U.S. 367, 409, and cases cited.

This Court not only has not consistently applied the law of any particular jurisdiction to interstate controversies involving the use of water of interstate streams, but it has studiously avoided tying its hands for the future by more than a determination of the guiding principle applicable to the case before it upon the particular facts actually before it for consideration. The doctrine of the decisions is perhaps best expressed in the language of Mr. Chief Justice *Fuller* in *Kansas* v. *Colorado*, 185 U.S. 125, at pages 146 and 147:

> "Sitting, as it were, as an international, as well as a domestic tribunal, we apply Federal law, state law, and international law, as the exigencies of the particular case may demand, and we are unwilling, in this case, to proceed on the mere technical admissions made by the demurrer."

This Court has recognized that an interstate controversy of this nature "rises . . . above a mere question of local

private right and involves a matter of state interest, and must be considered from that standpoint" (Mr. Justice *Brewer* in *Kansas* v. *Colorado*, 206 U.S. 46, at 99). In the case last cited the Court goes on, at page 100, to discuss the situation before it as it would be *if involving solely individual riparian proprietors.* In that case the Court said:

> "The question would be one of legal right, narrowed to place, amount of flow and freedom from pollution.
>
> "We do not intimate that entirely different considerations obtain in a controversy between two States. Colorado could not be upheld in appropriating the entire flow of the Arkansas River, on the ground that it is willing to give, and does give, to Kansas something else which may be considered of equal value. That would be equivalent to this court's making a contract between the two States, and that it is not authorized to do. But we are justified in looking at the question not narrowly and solely as to the amount of the flow in the channel of the Arkansas River, inquiring merely whether any portion thereof is appropriated by Colorado, but we may properly consider what, in case a portion of that flow is appropriated by Colorado, are the effects of such appropriation upon Kansas territory."

This language, together with other language found at pages 96-97 of the same opinion, shows the breadth of view taken by this Court when deciding important interstate disputes, which, in the case of completely independent sovereign States, would be settled either by diplomacy or by resort to war. It is, of course, true that the law of the States involved is one of the elements given consideration by this Court in such disputes.

See, *e.g.*, *Wyoming* v. *Colorado*, 259 U.S. 419, 458, 464 *et seq.*
Kansas v. *Colorado*, 206 U.S. 46, 94.

There is ample authority to the effect that the local law in force in either State is not conclusive, when this Court is acting in its *quasi*-international capacity.

See, *e.g.*, Mr. Justice *Holmes* in *Missouri* v. *Illinois*, 200 U.S. 496, 519-520:

> "The Constitution extends the judicial power of the United States to controversies between two or more States and between a State and citizens of another State, and gives this court original jurisdiction in cases in which a State shall be a party. Therefore, if one State raises a controversy with another, this court must determine whether there is any principle of law and, if any, what, on which the plaintiff can recover. But the fact that this court must decide does not mean, of course, that it takes the place of a legislature. Some principles it must have power to declare. For instance, when a dispute arises about boundaries, this court must determine the line, and in doing so must be governed by rules explicitly or implicitly recognized. *Rhode Island* v. *Massachusetts*, 12 Pet. 657, 737. It must follow and apply those rules, even if legislation of one or both of the States seems to stand in the way. ***But the words of the Constitution would be a narrow ground upon which to construct and apply to the relations between States the same system of municipal law in all its details which would be applied between individuals.*** If we suppose a case which did not fall within the power of Congress to regulate, the result of a declaration of rights by this court would be the establishment of a rule which would be irrevocable by any power except that of this court to reverse its own decision, an amendment of the Constitution, or possibly an agreement between the States sanctioned by the legislature of the United States." (Italics ours.)

Municipal law enters into international law as one of the elements or standards by which the obligation of a sovereign to do equity to another sovereign is measured.

See, *e.g.*, *Kansas* v. *Colorado*, 206 U.S. 46, 102-105.
Wyoming v. *Colorado*, 259 U.S. 419, 466-467.

It is not, we submit, the only element which will be considered by this Court. In the past this Court has said that it will consider precedents, treaties, and other authorities in international law.

Kansas v. *Colorado*, 185 U.S. 125, 146-147.

The Application of International Law.

It has applied a modified form of international law in interstate controversies—

Missouri v. *Illinois*, 200 U.S. 496, 518-522;
Alabama v. *Georgia*, 23 How. 505, 513;
Nebraska v. *Iowa*, 143 U.S. 359, 361-368 (in which international law authorities were treated as decisive of the case);
Louisiana v. *Mississippi*, 202 U.S. 1, 25, 49-52;
See *Arkansas* v. *Tennessee*, 246 U.S. 158, 172-174—

except, of course, where, under the Constitution of the United States, Federal law is supreme.

See, *e.g.*, *Wisconsin* v. *Illinois*, 278 U.S. 367 (navigation).
Pennsylvania v. *West Virginia*, 262 U.S. 553, 595 *et seq.* (interstate commerce).

Broader principles than the municipal riparian law of Connecticut and of Massachusetts are therefore applicable to this cause. This is a controversy between *quasi*-sov-

ereign States. To a very great extent the issues in this case are *quasi*-international, and the rights of the parties are fixed by international law. The late Chief Justice of this Honorable Court, in a discussion of a proposed world court some years ago, phrased this principle as follows:

> "A court to administer international justice is not new. Our own Supreme Court is one. Questions arise between states not settled by the Federal Constitution or Federal statutes. In the Kansas-Colorado case, Congress had no power to control Colorado. International law alone fixed the rights between the states and the Supreme Court enforced these rights."
>
> *Hon. William H. Taft*, "Papers on the League of Nations," p. 99.

The issue in the case at bar, we submit, calls for the application of international law principles of the same sort as those which controlled the decision of the International Commission which approved the application of the City of Winnipeg for permission to divert water from a tributary of the Lake of the Woods, an *international* water like the Connecticut River (see *infra*, this brief, part III C).

This Court also has given great weight to commercial and economic practices with respect to matters similar to those in issue in the territory affected by the particular controversy.

See, *e.g.*, *Missouri* v. *Illinois*, 200 U.S. 496, 521-522.
Kansas v. *Colorado*, 206 U.S. 46, 101, 105 *et seq.*
Wyoming v. *Colorado*, 259 U.S. 419, 466 *et seq.*

Compare the consideration given to the practical situation in the light of the best scientific knowledge available, in *New York* v. *New Jersey*, 256 U.S. 296, 309 *et seq.*

The willingness of this Honorable Court to examine not only the technical rules of law in force in each State, but also the prevailing practice as to the use of streams in the community, is pointed out by Mr. Justice *Holmes* in *Missouri* v. *Illinois*, *supra*, at pages 521-522:

> "As to the principle to be laid down the caution necessary is manifest. It is a question of the first magnitude whether the destiny of the great rivers is to be the sewers of the cities along their banks or to be protected against everything which threatens their purity. To decide the whole matter at one blow by an irrevocable fiat would be at least premature. If we are to judge by what the plaintiff itself permits, the discharge of sewage into the Mississippi by cities and towns is to be expected . . . These are facts to be considered. Even in cases between individuals some consideration is given to the practical course of events. In the black country of England parties would not be expected to stand upon extreme rights. *St. Helen's Smelting Co.* v. *Tipping*, 11 H.L.C. 642. See *Boston Ferrule Co.* v. *Hills*, 159 Massachusetts, 147, 150. Where, as here, the plaintiff has sovereign powers and deliberately permits discharges similar to those of which it complains, it not only offers a standard to which the defendant has the right to appeal, but, as some of those discharges are above the intake of St. Louis, it warrants the defendant in demanding the strictest proof that the plaintiff's own conduct does not produce the result . . ."

It is submitted, therefore, upon the authorities cited, that it is clear that the municipal law of the two States is not the only basis of legal principle upon which this cause will be decided; and that the Court will give due regard to the economic requirements of the two States involved; and

to principles, established by this Court and by international law, of equitable division of the benefits of the waters of interstate and international rivers as between States.

B. The Decisions of This Court Establish the Principle of the Equitable Division of the Benefits Arising from an Interstate River among the States through which the River Passes. This Doctrine, Referred to by the Special Master as the Rule of "Equality of Right," is Applicable to the Case at Bar, Provided that Connecticut had Proved Damage or Injury of Serious Magnitude.

Massachusetts contends that this Honorable Court has consistently recognized that a *quasi*-sovereign State may make use of its fair share of the benefits accruing from the presence of a portion of an interstate river within its borders. That use must be reasonable in the light of local conditions of terrain, geography, and rainfall. It must have due regard to commercial and business custom in the community as to the use of water. It is influenced in part by local municipal law. None the less, we submit that this Court has uniformly, in the exercise of its interstate jurisdiction, laid down a principle that under all the circumstances each State bordering upon an interstate stream is entitled to make what is substantially a permanent abstraction of a portion of the waters or of the beneficial use of the stream, providing the abstraction does not exceed the amount to which the State, as a *quasi*-sovereign, is entitled by international law as its share under an equitable division of the waters of the stream. Chronologically, the principal decisions are as follows:

Missouri v. *Illinois.*

Missouri v. *Illinois*, 180 U.S. 208 (1901). This was a bill in equity seeking to enjoin the discharge of Chicago's

sewage into the Mississippi River by means of the Sanitary Canal. Demurrers were overruled and leave was given to file answers to the bill. In 200 U.S. 496 (1906), the Court considered the testimony taken as to the effect of the Illinois project, which in substance was a permanent appropriation by Illinois of a portion of the potential beneficial use of the Mississippi watershed for the purpose of sewage dilution. The Court first determined that there was no superior Federal right (*e.g.*, navigation) involved (at pp. 518-520). It then determined that the Court must under the Constitution decide whether the conduct of Illinois was a proper exercise of sovereign right, which did not impinge on the equal sovereign rights of Missouri. The Court, relying on the common practice of making use of the Mississippi and its tributaries for sewerage purposes, judged Missouri by the standards she employed within her own borders (at pp. 521-522) and found that the evidence did not clearly establish the commission of a nuisance by Illinois (at pp. 523-526). The Court decided that the alleged injury was not sufficiently serious to justify equitable relief against a sovereign State (at pp. 520-521).

The decision was in substance a holding by this Court that Illinois had not made use of the stream in excess of its equitable share of the beneficial use of the waters. The case, when analyzed, involves an application of the principle of equitable division of beneficial user.

Kansas v. *Colorado.*

Kansas v. *Colorado*, 185 U.S. 125 (1901); 206 U.S. 46 (1907). This was a bill in equity brought by Kansas to enjoin the permanent diversion of water from the Arkansas river by Colorado for the purpose of irrigation. In overruling a demurrer the Court declined to "proceed on the mere technical admissions made by the demurrer" to a final decision, before considering the case upon its merits,

in view of the fact that the applicable law depended upon the "exigencies of the particular case" (at p. 147).

After the taking of testimony, this Court considered the case upon its merits (206 U.S. 46). The decision affirmed the jurisdiction of the Court to treat the controversy as rising "above a mere question of local private right" and as "a matter of state interest" (at p. 99), which must be determined upon a broad consideration of all the geographical, natural, and economic circumstances. The following language (at p. 97) indicates that the Court believed that it was bound to apply in accordance with international law, the doctrine of "equality of right":

> "As Congress cannot make compacts between the States, as it cannot, in respect to certain matters, by legislation compel their separate action, disputes between them must be settled either by force or else by appeal to tribunals empowered to determine the right and wrong thereof. Force under our system of Government is eliminated. The clear language of the Constitution vests in this court the power to settle those disputes. . . . Nor is our jurisdiction ousted, even if, because Kansas and Colorado are States sovereign and independent in local matters, the relations between them depend in any respect upon principles of international law. *International law is no alien in this tribunal.*
>
> * * * * * * * *
>
> "One cardinal rule, underlying all the relations of the States to each other, is that of *equality of right.* Each State stands on the same level with all the rest. It can impose its own legislation on no one of the others, and is bound to yield its own views to none. Yet, whenever, as in the case of *Missouri* v. *Illinois,* 180 U.S. 208, the action of one State reaches through the agency of natural laws into the territory of an-

other State, the question of the extent and the limitations of the rights of the two States becomes a matter of justiciable dispute between them, and this court is called upon to settle that dispute in such a way as will recognize *the equal rights of both* and at the same time establish justice between them. In other words, through these successive disputes and decisions this court is practically building up what may not improperly be called *interstate common law*. . . . Surely here is a dispute of a justiciable nature which must and ought to be tried and determined. If the two States were absolutely independent nations it would be settled by treaty or by force. Neither of these ways being practicable, it must be settled by decision of this court." (Italics ours.)

The Doctrine of Equitable Division Applied.

In view of the fact that "Kansas . . . recognizes the right of appropriating the waters of a stream for the purposes of irrigation, subject to the condition of an *equitable* division between the riparian proprietors" (at p. 104), the Court denied specific relief inasmuch as the evidence failed to show that under all the applicable circumstances Colorado had permanently taken more than her fair share of the waters of the river or had done any act which worked substantial detriment to the States lower on the river (at p. 117). The Court, however, in reaching its conclusions, did not even purport to apply "the extreme rule of the common law" (at p. 103), but based its decision upon a consideration of (at p. 100) "the effect of what has been done upon the conditions in the respective States," and so adjusted "the dispute upon the basis of equality of rights as to secure as far as possible to Colorado the benefits of irrigation without depriving Kansas of the like beneficial effects of a flowing stream." Clearly, the decision was

based upon the international law principle of equitable division of the benefits of a flowing stream as between the States having an interest in the stream. Upon no other basis can be explained the action of the Court (at pp. 113-114) in weighing the benefit to Colorado and the amount of detriment to Kansas caused by the diversion there in question. Similar language appears at page 117, where the Court clearly points out that its guiding principle is "an equitable division of benefit" of the waters of the Arkansas as between the two States.

The Special Master in the case at bar (Rep. Sp. M. 8-9) construed the decision in *Kansas* v. *Colorado* in accordance with this view, stating that in his judgment the opinion laid down as "the cardinal rule as between States . . . equality of right, saying that the question should be viewed not narrowly and solely as to the amount of flow in the Arkansas river, inquiring merely whether any portion thereof was appropriated by Colorado, but rather to determine how much Colorado might fairly appropriate under the rule of equality and the effect of such appropriation upon the lower state. The court awarded to the upper state the use of a very large share of the water. In reaching this conclusion the court adopted its own rule of international law. In each international case as it arises, I think the Supreme Court will adopt that rule of law which best works out equality and equity in the particular case. The result reached in *Kansas* v. *Colorado* it seems to me would not have been different whether Kansas recognized to a certain extent appropriation rights in water or not."

Wyoming v. *Colorado.*

Wyoming v. *Colorado*, 259 U.S. 419 (1922), was a case involving a diversion by Colorado of certain of the upper waters of the Laramie River, which flows from Colorado into Wyoming. The latter State sought an injunction of such diversions in Colorado as were subsequent in time to

certain Wyoming diversions and as constituted an inequitable use of the waters of the stream. The whole geographical and economic situation was brought to the Court's attention, as well as both international and local precedents in similar cases (see esp. pp. 425-427, 431, 434-438). The Court examined at length the whole situation of fact in the light of the history of the area affected by the controversy; it considered the uses to which water had been put in the two States both in pioneer days and after their admission as States; it considered the system of water law under which settlers in both States had turned arid desert into fertile agricultural land. From this examination the Court came to the conclusion that in the particular case equitable division of use between the contesting States should be obtained by adopting the "doctrine of appropriation as . . . the only basis which is consonant with the principles of right and equity applicable to such a controversy," in the light of the whole background of the case. The Court examined each of the claimed appropriations in each State, classified them as to priority, and by its decree permitted Colorado to continue only so much of the diversions sought to be enjoined as could be held to be proper and reasonable in view of the principle which in the particular case was deemed to result in an equitable division of the beneficial user of the stream as between the two States.

The Special Master (Rep. Sp. M. 11) applied this doctrine of the *Wyoming* case to the case at bar in the following language:

> "In that case to secure equality of right the court permitted Colorado to divert for irrigation in another watershed. I see no reason why the same principle should not apply here, provided only the diversion of water is reasonable and no more than consistent with Connecticut's equality of right. If Massachusetts would have a right to abstract this much water under

any system of law she might follow and for any use legal by that system. I cannot see that Connecticut has a better right merely because she and Massachusetts adopted the common law of England."

North Dakota v. *Minnesota*, 263 U.S. 365 (1923), which involved the use by Minnesota of waters lying within its borders in such a way as to affect to some degree the amount of water in a watercourse bordering upon both States, was in substance a decision that Minnesota had not in fact caused any damage of great magnitude to North Dakota. Certainly Minnesota had not taken more than her fair and equitable share of the potential beneficial use of the waters and watercourses of an interstate watershed. Similarly in *New York* v. *New Jersey*, 256 U.S. 296, there is perhaps a holding *sub silentio* to the effect that the defendant State in that case had not been shown to have appropriated more than its equitable share of the sewage dilution capacity of Upper New York Bay, an interstate water.

The Drainage Canal Case.

Wisconsin v. *Illinois*, 278 U.S. 367 (1929), involved largely the decision of questions based on an application of Federal law governing the control of navigable waters. Upon the facts and the report of the Special Master the Court found that the diversions by Chicago were not proper, largely because they were in excess of the water which could be taken without injury to the navigable capacity of the lakes. This fact alone made it so clear that Illinois was taking more water than it had any just claim to, either under any principle of equitable division or under the Federal law applicable to navigable waters, that the doctrine of equality of right was not considered at length by this Court (see pp. 417-419). The case, however, casts no doubt upon the validity of the principle of equitable

division of the beneficial user of interstate waters as between interested States, in any case where no superior Federal right, such as navigation, is injured.

The Final Decree in the Chicago Drainage Canal Case Recognizes the Prior Claim of Water Supply.

The second report of the Special Master in the *Chicago* case, and the final opinion of this Court (281 U.S. 179, 196, 201) cast no doubt upon the equity of Chicago's claim to divert sufficient water from the lakes for domestic uses of drinking, washing, and the like. By the terms of the final decree (281 U.S. 201, 696, 697; see also Report of the Special Master on Re-reference, pp. 120, 143, and 147 *et seq.*), the diversion requirements of the domestic water supply of Chicago are to be met as a claim upon the waters of the lakes even ahead of the requirements of navigation. Further diversions under the decree would be permitted only in the light of the necessities of navigation. The parties to the *Chicago* case, the Special Master, successive Secretaries of War, and this Honorable Court (so far as it has had occasion to consider the point *sub silentio*), apparently have felt no doubt that the claim of Chicago to a reasonable diversion for a domestic water supply was to some extent a prior lien upon the waters of the lakes, entitled to great respect unless expanded to grossly unreasonable limits. The doctrine of priority of claim in behalf of municipal water supplies has thus been given weight in the adjustment of an interstate controversy before this Court. Also, as the Special Master in the case at bar pointed out (Rep. Sp. M. 9), this Court "in the final decree [in the *Chicago* case] allowed a diversion estimated to reduce the level of the Great Lakes about one inch . . . into another watershed." It is submitted that the case is an authority which supports the Special Master's ruling against "any right of Connecticut to object to the diversion regardless of damage to the Connecticut River" (Rep.

Sp. M. 11-12) and purely because the diversion is to another watershed, provided the diversion is proper under the doctrine of equality of right and equitable division as between riparian States.

It is submitted that the cases just reviewed establish clearly the doctrine of "equality of right" or "equitable division" of the benefit of interstate streams as between the riparian *quasi*-sovereign States. This being so, Connecticut's exceptions numbered 10, 11, 13, 14, 15, 21, and 22 (Conn. Exc. pp. 10-12) are without merit, so far as they rest on the theory that this Court is bound by strict principles of riparian law.

C. International Law Establishes the Principle of Equitable Division of the Benefits of Interstate Waters as between the Sovereigns through whose Lands the Waters Pass. In Making an Equitable Division of Beneficial Use, Due Weight Must be Given to the Comparative Benefit to be Derived by Each Sovereign from Each Particular Use. The Fundamental and Most Important Use of Water is for Quenching Thirst and for Other Domestic Purposes.

We have contended above that this Court applies international law whenever it is appropriate for the settlement of controversies between the *quasi*-sovereign States of the Union. In the matter of the equitable division of interstate waters as between nations, international precedents and authorities are available which are of assistance in a cause like this, so far as the relation between two States of the United States is analogous to the relation between two nations of the world. There are numerous rivers which may be said to be international in the sense that they separate or traverse the territories of more than one State; and during the course of the past century an elaborate body of international law has been developed with reference to these rivers.

The chief interest in international rivers during the past century was in reference to their navigation. Hence most of the international law which has been developed has to do with problems of navigation. Numerous treaties have been made, the principal object of which is to protect the common interest of States in the navigation of streams. So numerous have these treaties been, and so general is their scope, that there may now be said to be a body of international law which exists apart from any basis to be found in particular treaties.

Of course, so far as the *issues of navigation* in the case at bar are concerned, the principles established by international law are of slight assistance, inasmuch as, under the Constitution, the control of navigable waters is vested almost entirely in Congress and in those to whom Congress has delegated authority. However, to the extent that international treaties and decisions regarding freedom of navigation of international waters attempt to apply the doctrine of equitable distribution of the benefits of the navigable capacity of such waters, those authorities strengthen the doctrine which this Court has (as we have argued above) applied consistently in interstate litigation.

The Development of International Law as to Uses of Water.

While most of the international law relating to international streams has been developed with reference to problems connected with their navigation, in recent years the waters of such streams have been put to many other uses. Water is now used more and more extensively for domestic purposes such as drinking, for sanitation purposes such as the disposal of sewage, for agricultural purposes such as irrigation, for industrial purposes such as the generation of electrical power, and for other purposes unconnected with navigation. We have collected a num-

ber of international precedents showing the principle of equitable division as it has been stated by commentators and as it has been applied through various methods in the adjustment of international and interstate disputes. [These international precedents will be found in Appendix A of a brief (bound in yellow) filed by Massachusetts in opposition to Connecticut's motion to strike out and to dismiss the defendant's answer. Copies of this brief are in the possession of the clerk of this Honorable Court.] Those precedents which bear most directly upon the issues now before this Honorable Court, we shall summarize briefly here. Perhaps the most striking examples of international provision for the use of the waters of a stream are to be found in the practice of the United States, which may be studied with reference to common waters of the United States and Mexico, and to common waters of the United States and Canada.

The Priority of Use Doctrine Recognized.

The development of our relations with Canada has frequently called for provisions concerning the diversion of certain boundary waters. By the convention of January 11, 1909, certain waters are defined as "boundary waters" and an International Joint Commission was created with jurisdiction over cases involving the use or obstruction or diversion of certain waters. Article 8 of this convention provides principles which are to guide the International Joint Commission, among which are the following:

> "The High Contracting Parties shall have, each on its own side of the boundary, equal and similar rights in the use of the waters hereinbefore defined as boundary waters.
>
> "The following order of precedence shall be observed among the various uses enumerated hereinafter for these waters, and no use shall be permitted which

tends materially to conflict with or restrain any other use which is given precedence over it in this order of precedence:

"(1) Uses for domestic and sanitary purposes;

"(2) Uses for navigation, including the service of canals for the purposes of navigation;

"(3) Uses for power and for irrigation purposes.

"The foregoing provisions shall not apply to or disturb any existing uses of boundary waters on either side of the boundary.

"The requirement for an equal division may in the discretion of the Commission be suspended in cases of temporary diversions along boundary waters at points where such equal division can not be made advantageously on account of local conditions, and where such diversion does not diminish elsewhere the amount available for use on the other side" (36 STAT. AT L., 2448).

Preference to Municipal Water Supplies.

In this treaty expressly appears not only a clear recognition of the doctrine of the equitable division of the beneficial user of international waters, but also a straightforward declaration that preference is to be given to a nation desiring to use water for domestic purposes over a nation desiring to use water for some less fundamental cause. A similar recognition of the prior claim of a domestic water supply is to be found in the final decree recently entered upon the recommendation of the Special Master in the *Chicago Drainage Canal* case (281 U.S. 696).

One interesting controversy has arisen under the treaty of January 11, 1909 (just quoted above), the decision of which clearly recognizes the prior importance of the use of water for domestic purposes. The International Joint Commission established under the treaty handed down an

opinion on January 14, 1914, concerning the application of the Greater Winnipeg Water District for the diversion and use of water from Shoal Lake and the Lake of the Woods. Shoal Lake is a tributary of the Lake of the Woods, a boundary water under the treaty. Winnipeg desired to make the diversion for domestic and sanitary purposes. The Greater Winnipeg Water District obtained the permission of the Province of Ontario, in which Shoal Lake is situated, to make such use of the water. The War Department of the United States entered an appearance before the Commission and stated that "the War Department feels that the proposed diversion by the Winnipeg Water District is so small a factor of the general problem as to be practically insignificant, and that no valid reason exists for objecting to its consummation." The town of Kenora, Ontario, however, opposed the diversion on the ground that it would lower the level of the Lake of the Woods and contended that other water was available to Winnipeg.

After thorough investigation the Commission found that the diversion was "not of any great moment" and approved the application. Its conclusion is as follows:

> "To sum up, we believe that it is absolutely necessary for the city of Winnipeg and the Greater Winnipeg Water District, the applicant, to obtain a sufficient supply of good, pure, and wholesome water; that after examining the available sources of supply, the applicant has shown that the best source, the cheapest, the most abundant, and the purest is Shoal Lake; that the diversion of the waters of Shoal Lake and the resultant decrease of the flow of the waters of the Lake of the Woods at the outlet of the lake, is, for the present at least, practically unimportant, and without any effect upon the industries and plants established at Kenora, and, finally, that the granting of the privilege of taking

> the waters of Shoal Lake has been surrounded by such safeguards that all the interests are amply protected."

An agreement between the United States and Canada was signed at Washington, February 24, 1925, for regulating the level of the Lake of the Woods. Article 2 of the agreement states its object to be to secure "the most advantageous use of the waters" for "domestic and sanitary purposes, for navigation purposes, for fishing purposes, and for power, irrigation and reclamation purposes." This agreement dealing only with one particular body of water clearly recognizes not only the principle of equitable division but also the prior claim of a domestic water supply upon the waters of an international lake (see 44 STAT. AT L., 2108).

A Pending Equitable Division.

Preparatory work for a similar arrangement with Mexico, based upon the principle of equitable division, is now in progress under the authority of the Act of May 13, 1924, 43 STAT. AT L., Part I, p. 118, entitled:

> "An Act Providing for a study regarding *the equitable use* of the waters of the Rio Grande below Fort Quitman, Texas, in co-operation with the United States of Mexico." (Italics ours.)

Section 1 reads, in part:

> "The President is hereby authorized to designate three special commissioners to co-operate with representatives of the United States of Mexico in a study regarding the equitable use of the waters of the Rio Grande below Fort Quitman, Texas, with a view to their proper utilization for irrigation and other beneficial uses. . . ."

Foreign Interstate Litigation Precedents.

Courts, other than this Honorable Court, have seldom been called upon to deal with questions relating to the division of waters between States. But the jurisprudence of the Federal Tribunal of Switzerland affords some interesting cases. In 1878 the Canton of Argovie sought to restrain the Canton of Zurich from putting into effect certain concessions which would involve the damming of the river Johenbuch, which flowed from the territory of Zurich into the territory of Argovie. The Federal Tribunal found itself competent, but dismissed the application, on the ground that equality between the cantons did not exclude the common use of the waters and did not necessitate an undiminished or uninterrupted flow of the water (*Arrêts du Tribunal Federal Suisse*, IV, p. 34). The same principle was followed in *Canton of Argovie* v. *Canton of Soleure, Arrêts du Tribunal Federal Suisse*, XVIII, p. 689.

Summary—Equitable Division is the Guiding Principle.

The recent developments of treaty law on the subject of the use of waters in an international stream is clearly based on an effort to assure to the States concerned an equitable division of the waters, and we submit that the principle may be said to have become established that even in the absence of conventional agreement an equitable division may be made, so that each State through whose territory a stream flows may make an equitable use of the water. A tendency is clearly manifest, also, to distinguish between various uses which may be made of water. The hierarchy of uses will depend largely on the locality and on the special conditions prevailing with respect to the particular stream. In some cases, navigation is to be put first, perhaps; but it is significant that under some treaties it is provided that other uses should be given precedence, and that the Convention

of 1909 between the United States and Canada puts *before* navigation "uses for domestic and sanitary purposes." No more satisfactory classification of uses can be found than in the 1909 convention, and it is significant that that classification is followed in the enumeration in the *Lake of the Woods Agreement of 1925.*

In the Connecticut River watershed, of course, there can be no question of interference with navigation, in view of action taken by the War Department. It is merely a question of the propriety and equitable nature of the use being made by Massachusetts for domestic purposes, and the Special Master has found that use to be reasonable.

D. Under the Municipal Law both of Connecticut and of Massachusetts, so far as it Furnishes an Analogy of Weight in this Case, the Massachusetts Project would be Deemed Reasonable.

1. Under the Riparian Law in Force both in Massachusetts and in Connecticut a Riparian Owner is Entitled to Make a Reasonable Use of the Waters Flowing Past His Land, having Due Regard for the Interests of Upper and Lower Riparian Owners upon the Same Stream.

The general common-law rule as to the rights of riparian owners, as in force in Massachusetts, has been stated as follows:

> "The right of each riparian owner is to have the natural flow of the stream come to his land and to make a reasonable and just use of it as it flows through his land, subject, however, to the like right of each upper proprietor to make a reasonable and just use of the water on its course through his land and subject further to the obligation to lower proprietors to permit the water to pass away from his estate unaffected ex-

cept by such consequences as follow from reasonable and just use by him."

Stratton v. *Mount Hermon Boys' School*, 216 Mass. 83, 85 (see cases cited).

See *Taft* v. *Bridgeton Worsted Co.*, 237 Mass. 385, 388.

Collins Mfg. Co. v. *Wickwire Co.*, 14 Fed. (2d) 871, 872.

Parker v. *American Woolen Co.*, 195 Mass. 591, 598-599.

Mason v. *Whitney*, 193 Mass. 152, 158.

McNamara v. *Taft*, 196 Mass. 597, 599.

Isbell v. *Greylock Mills*, 231 Mass. 233, 236.

Parker v. *Griswold*, 17 Conn. 288, 299.

Stamford Extract Mfg. Co. v. *Stamford Rolling Mills Co.*, 101 Conn. 310, 320.

Buddington v. *Bradley*, 10 Conn. 212.

What constitutes a reasonable use is purely a question of fact, involving an application of the legal principle above stated to the situation presented before the Court.

Elliot v. *Fitchburg R.R.*, 10 Cush. 191, 195.

Mason v. *Whitney*, *supra*.

Parker v. *American Woolen Co.*, *supra*.

McNamara v. *Taft*, *supra*, at p. 599.

Roach v. *Sturdy*, 250 Mass. 357, 358-359.

Hazard Powder Co. v. *Somersville Mfg. Co.*, 78 Conn. 171.

Keeney & Wood Mfg. Co. v. *Union Mfg. Co.*, 39 Conn. 576 (criteria as to reasonable use of water by a mill).

Water Commrs. v. *Perry*, 69 Conn. 461, esp. 467.

Donnelly Brick Co. v. *New Britain*, 106 Conn. 167; 137 Atl. 745.
Gillett v. *Johnson*, 30 Conn. 180.
Parker v. *Hotchkiss*, 25 Conn. 321, 330.

It is undisputed, both in Connecticut and Massachusetts, that diversion of water of a stream for use upon riparian property within the same watershed is entirely proper if it constitutes as a matter of fact a reasonable use of the waters of the stream by the riparian owner.

Stratton v. *Mount Hermon Boys' School*, *supra*.
Hittinger Fruit Co. v. *Cambridge*, 218 Mass. 220 (percolating waters).
Isbell v. *Greylock Mills*, 231 Mass. 233 (where relief was denied).
Keeney & Wood Mfg. Co. v. *Union Mfg. Co.*, 39 Conn. 576, 582 (where diversion and mill use are compared).
Gillett v. *Johnson*, 30 Conn. 180, 183 (diversion of a small stream for purposes of irrigation).
Parker v. *Griswold*, 17 Conn. 288, 297 *et seq.*
See *Wier* v. *Covell*, 29 Conn. 197 (where the decision is based in part upon conveyances there involved).

As to a diversion outside the watershed, the Massachusetts cases are clearly to the effect that use of water outside the watershed is proper if in fact the use in the particular case constitutes a reasonable use of the waters of the stream in such a way as to cause no material damage to the interests of lower riparian owners. Unless there is actual or perceptible damage to a lower riparian owner, not even

nominal damages will be awarded upon his bringing an action of tort based upon the diversion.

Elliot v. *Fitchburg R.R.*, 10 Cush. 191.
Stratton v. *Mount Hermon Boys' School*, 216 Mass. 83, 85.

Upon the same principle, specific relief in equity will be denied to a complainant who cannot show that the diversion which he seeks to enjoin has caused actual damage to his right to make a reasonable use of a stream.

Isbell v. *Greylock Mills*, 231 Mass. 233, 236.

In most of the decided Connecticut cases the diversion complained of was in any event an unreasonable use of the water under the particular circumstances involved, so the question discussed in Massachusetts in the case of *Elliot* v. *Fitchburg R.R.*, 10 Cush. 191, has not been squarely ruled upon in Connecticut. The majority of the riparian cases in the two States deal with diversions from very small streams where any interference with the flow of the stream would be directly and immediately felt by lower riparian proprietors. None of the decided cases involved a situation of fact where the diversion, though taking many gallons of water, removed from the watershed only a very small percentage of the stream flow at the point where it reached the land of the complainant lower riparian owner. The Courts deciding the riparian precedents in the two jurisdictions did not have before them a situation involving large riparian owners and diversions of considerable quantity in themselves but of small proportions to the normal stream flow. This fact, among others, makes the riparian precedents hardly applicable to the case at bar—where the two riparian owners involved are two *quasi*-sovereign States; where the flow of water in the interstate

stream is on the average 17,000 cubic feet per second at the point where it reaches the complainant State (see Joint Sum. p. 3; Transcript, pp. 137, 656); where the diversion (taking place some fifty or more miles upstream on small tributaries) involves on the average about two per cent of the flow at the state line (see Rep. Sp. M. 5) and takes place almost entirely in times of very high flows.

The Courts of Connecticut will not award substantial damages for a diversion from the watershed which causes no material injury, nor will they enjoin such a diversion. Apparently due weight is given to considerations of comparative damage and to facts constituting a basis for giving substitutional relief by way of damages rather than specific relief in the form of an injunction.

Watson v. *New Milford Water Co.*, 71 Conn. 442, 450.

Cf. Harding v. *Stamford Water Co.*, 41 Conn. 87, 95.

Balf Co. v. *Hartford Electric Light Co.*, 106 Conn. 315.

In substance, we submit, the rule in Connecticut is fully as liberal with respect to reasonable but permanent diversions from the watershed as that laid down in the *Stratton* case for Massachusetts.

That the State of Connecticut permits the diversion of water from the watershed for use as a domestic water supply under State or municipal control is apparent from the cases cited. Due compensation for *actual damage* caused by the diversion must, of course, be paid.

See also *Beckerle* v. *Danbury*, 80 Conn. 124, 127.

It would seem that the Connecticut Courts in a proper case would give due consideration to the amelioration of

damage by compensation in kind by augmenting the flow of the diverted stream in dry seasons.

Harding v. *Stamford Water Co.*, 41 Conn. 87, 93.

The rule of reasonable user in the light of the circumstances in each particular case also extends to analogous matters, such as pollution. Each State permits a riparian owner to appropriate a reasonable amount of the capacity of a stream for dilution of sewage and waste.

Parker v. *American Woolen Co.*, 195 Mass. 591.
McNamara v. *Taft*, 196 Mass. 597.
Collins Mfg. Co. v. *Wickwire Co.*, 14 Fed. (2d) 871.
Merrifield v. *Lombard*, 13 Allen 16.
Harris v. *Mackintosh*, 133 Mass. 228.
Martin v. *Gleason*, 139 Mass. 183.
Nolan v. *New Britain*, 69 Conn. 668.
Platt Bros. & Co. v. *Waterbury*, 72 Conn. 531.
Laxton v. *Herrick*, 83 Conn. 417, 425.
Morgan v. *Danbury*, 67 Conn. 484.
See *Donnelly Brick Co.* v. *New Britain*, 106 Conn. 167, and cases cited.
See also *Rockport* v. *Elwell*, 219 Mass. 287.
Ingraham v. *Dunnell*, 5 Met. 118 (where apparently damages were held to be adequate).
Brookline v. *Mackintosh*, 133 Mass. 215.
Stamford Extract Mfg. Co. v. *Stamford Rolling Mills Co.*, 101 Conn. 310.
Rockville, etc., Co. v. *Koelsch*, 90 Conn. 171.
Cf. DeWitt v. *Bissell*, 77 Conn. 530.

So far as the local law of Connecticut and of Massachusetts is here of importance, we submit that it lays down a

principle of reasonable user as between riparian owners—a principle of equality of right and opportunity limited only by the obligation not to inflict serious and substantial injury on others equally entitled. It further appears that both States lay some emphasis on the doctrine that specific relief can only be grounded on serious injury to the complainant by the diversion, and even if serious injury appears, serious consideration will be given by the Courts to equitable considerations of expediency and comparative damage. It is submitted, however, that this is not a matter to be settled by an application of any strict riparian rule (such as might be enforced between individuals), even regarding both States engaged in this case as riparian owners on a large scale. On the contrary, Massachusetts contends that the Special Master was right in ruling (Rep. Sp. M. 6-12) that broad considerations of equity and right should be taken into account in a controversy between States, and that "if Massachusetts would have a right to abstract this much water under any system of law she might follow and for any use legal by that system," Connecticut has no better basis for objecting to the present diversion "merely because she and Massachusetts adopted the common law of England."

2. *Connecticut Habitually Permits Diversions of Streams to Other Watersheds for the Purpose of Supplying Municipalities with Water for Domestic Use. Connecticut in Equity Cannot Complain if Massachusetts Makes Reasonable Use of Interstate Waters Arising within her Borders for Similar Purposes, even if a Diversion be Necessary; provided Massachusetts does Not Permanently Abstract More than the Share of Such Interstate Waters to Which She is Entitled under the Doctrine of Equal Division of Benefit.*

Under the decisions of this Court, the municipal practice in the States, which are parties to the controversy, is

considered in the determination of the basis of making an equal division of benefit. In the case at bar, if it appears that Connecticut habitually permits diversion of streams for the purpose of water supplies, or that Connecticut recognizes the priority of a claim to use water for domestic purposes over a claim to use water for power or for sanitation, it would warrant this Court in coming to the conclusion that the doctrine of equitable division should be applied so as to permit Massachusetts to make similar diversions for similar purposes, provided that the action of Massachusetts does not have any seriously detrimental effect upon the ability of Connecticut to make a like diversion.

Connecticut for some years has by general statute permitted municipalities and public service water companies to make diversions for water supply purposes. Section 2542 of the General Statutes of Connecticut (1918 revision) reads in part as follows:

> "*Power to take lands and streams.* Any town, city, borough or corporation authorized by law to supply the inhabitants of any town, city or borough with pure water for public or domestic use may take and use such lands, springs, streams or ponds, or such rights or interests therein, as the superior court, or any judge thereof in vacation, may, on application, deem necessary for the purposes of such supply. . . . Compensation shall be made to all persons entitled thereto in the manner provided by section 2543."

Chapter 131 of the General Statutes contains comprehensive provisions for the safeguarding of water supplies, and shows the importance attached by Connecticut to a pure supply of suitable and fresh water for its cities and towns. Section 5181 gives a broad permission to State departments to take water for use in State institutions.

By special act many municipalities and public water companies in Connecticut are authorized to make particular

diversions for municipal water supplies; in some cases the grant of power to make diversions being couched in general terms and apparently applying to all water flowing through or lying within Connecticut; in other cases, limited to the waters within stated geographical limits. An exhaustive list of the many special acts incorporating water companies or authorizing general or particular diversions would serve no useful purpose here. A few instances representative of a very large body of such legislation will suffice.

Ansonia Water Company, Incorporated, Conn. Act of July 9, 1884, Priv. Laws, Conn., vol. 5, p. 665, section 9, provides, in part:

> "The said company shall have full power . . . to construct . . . such reservoir or reservoirs as they may deem expedient or necessary; to take and use the water of any spring or springs, stream or streams, or other waters to such extent and in such manner as may be necessary or expedient . . . to the most perfect and complete supply of the borough of Ansonia with pure water for all public and private uses. . . ."

The charter was amended in 1909 (Spec. Laws, Conn., vol. 15, p. 971) to permit supplying the village of Ansonia "with an abundant supply of pure water for public, domestic, and general use."

Similar provisions are to be found in the Special Laws, as follows:

Vol. 5, p. 244 (1859), Birmingham;
Vol. 11, p. 38 (1893), Bradford Water Company;
Vol. 4, p. 1356 (1856), Bridgeport Water Company;
Vol. 9, p. 910 (1884), Bristol Water Company—restricted by amendment to geo-

graphical limits, vol. 16, p. 240 (1911), but extended somewhat, Spec. Acts, Conn. (1919), c. 164;

Vol. 5, p. 673 (1864), Centreville Water Company;

Vol. 15, p. 584 (1907), Cornwall Water Company;

Vol. 5, p. 333 (1860), Danbury;

Vol. 12, p. 91 (1895), Farmington Water Company;

Vol. 14, p. 323 (1903), Glenville Power and Water Company—[providing for the development of reservoirs on the Byram River, an interstate stream. Amended Spec. Acts, Conn., 1927, c. 340, to permit supplying certain towns in Westchester County, State of New York, as well as Connecticut towns. A similar provision with respect to the Greenwich Water Company is found in Spec. Acts, Conn., 1925, c. 340.]

Spec. Acts, Conn., 1925, c. 295, gave broad new powers to the New Haven Water Company with respect to a diversion of the waters of the Hammonassett River (see also Spec. Acts, Conn., 1919, c. 129).

A diversion was authorized from the Connecticut River itself to supply Hartford (Priv. Laws, Conn., vol. 4, pp. 1364, 1366 [1851]). This supply has since been abandoned and has been supplanted by other diversions from the pure upland waters of interstate tributaries of the Connecticut River (Conn. Spec. Laws, vol. 16, part 1, pp. 389-395; Joint Sum. p. 88; Transcript, pp. 510-511, 1456).

These statutory citations are sufficient, we submit, to show that in Connecticut there is a well-established policy of permitting diversions for the purpose of water supplies. The decisions of the Courts sustain this policy to the utmost, and, though compensation must be paid for any

damage to property actually sustained by individuals, it is a question in each case of condemnation what that damage, if any, really is. If there were no substantial damage to a lower riparian owner, only nominal damages would be given.

The extent to which the Connecticut policy goes is shown by the case of *East Hartford Fire District* v. *Glastonbury Power Co.*, 92 Conn. 217. In that case the Connecticut Court upheld a taking for municipal water-supply purposes of water privileges held by the defendant company for future use for public utility purposes. In effect the Connecticut Court announced that the Legislature had intended to establish a priority of privilege in favor of municipal water supplies, superior even to use of water for other public or *quasi*-public purposes.

Nor is the Connecticut policy supporting privileged use for municipal water supplies confined to any meagre construction of present necessities. The cities and towns of the State and the public service water companies that supply them are entitled to make due preparations for future necessities.

In *New Haven Water Co.* v. *Russell*, 86 Conn. 361, the power and obligation of a public service water company to anticipate future water requirements of a great city was stated by *Wheeler*, J., as follows:

> "The respondents further insist that the court erred in overruling its claim that 'the time within which such reasonably definite amount of water is necessary, must be either present or within a reasonably short time in the future'; and they ask to have the finding corrected in certain particulars upon which the conclusion of necessity rests, and insist that the facts found by the judge do not legally support his conclusion of necessity.
>
> * * * * * * * *

> ". . . A private corporation engaged in furnishing a water-supply to a community owes it the duty of providing an adequate supply of wholesome water at all times. Experience teaches that consumption increases largely in the summer season, and that changeable seasons, long droughts, and the liability of accidents are contingencies which must be guarded against; a supply adequate for the ordinary season or the present need will not protect against such contingencies. . . . Growth in population and in industrial activity, with consequent increasing use of water, must be anticipated and provided for. . . . Provision for all such likely contingencies must not be scant; it must be ample, so that the health of the people be preserved and their property safeguarded from fire, and all their countless activities—so variously served by an abundant water-supply—be sustained and developed. . . ."

The Special Master in the case at bar has found that Connecticut will be caused no substantial damage by the Massachusetts water-supply project. Upon such an actual state of fact, if found by the trier of the fact in an *intra*state condemnation suit, the lower riparian owner would be entitled to no damages, or at most to purely nominal damages. Under the most strict and rigid construction of the common law of riparian rights a lower riparian owner would in such circumstances have no basis of action against an upper riparian owner causing no damage by a diversion. Certainly he could obtain no specific relief in equity. Even if some slight damage were caused to Connecticut by the proposed diversions (which does not appear here), the practice of Connecticut with respect to municipal water supplies would lead this Court in applying the doctrine of equitable division of the benefit of interstate waters to consider whether equity did not require that Connecticut be remitted to substitutional relief by

way of damages at law and individual inhabitants to relief based upon the terms of the Massachusetts statutes. See *Mannville Co.* v. *Worcester*, 138 Mass 89; *Brickett* v. *Haverhill Aqueduct Co.*, 142 Mass. 394, 396; *Andrus* v. *Berkshire Power Co.*, 145 Fed. 47; 147 Fed. 76; cert. den. 203 U.S. 596. See also an interesting opinion in which the Attorney General of Massachusetts declined to take action against Connecticut at the request of Massachusetts landowners injured to some extent by the flowage of their land by a power project carried out in Connecticut. In vigorous language the then Attorney General states that it is not his duty to represent the Commonwealth in interstate controversies except where in some way the general welfare of the community has been seriously affected by the action of another sovereign. The existence of a right to sue for compensation in Connecticut even for damage to Massachusetts land was regarded as affording a reasonable remedy to citizens of Massachusetts affected by the act of the Connecticut company. See Memorandum, Mass. Op. Atty. Gen., vol. III (1908), p. 596. The existence of a remedy at law for individual inhabitants of Connecticut or persons owning lands in Connecticut is an element which this Court should consider under the doctrine of equitable division, particularly in view of the fact that the statutes of Connecticut have established a policy of forced taking of waters for municipal water supplies.

E. The Special Master was Correct in Finding that the Metropolitan District about Boston ought Not to be Compelled to Resort to Inferior, Polluted, and Inadequate Waters Said by Connecticut to be Available in Eastern Massachusetts.

1. The Contention of Connecticut that Massachusetts has Available Supplies of Water Elsewhere than in the Ware and Swift Rivers is Immaterial, unless This Court Reverses the Findings of Fact of the Special Master and Decides that Connecticut has Shown Substantial Damage Resulting from Some Act of Massachusetts. In That Event the Evidence upon the Existence of Other Water Sources may be Material as Bearing upon the Issue of whether This Honorable Court in Equity Ought to Grant any Specific or Injunctive Relief.

The Connecticut reply avers that there are supplies of water available in Eastern Massachusetts which the General Court of Massachusetts could have authorized Boston to use. That allegation and the evidence introduced in support of the allegation by Connecticut (over the objection, duly noted, of Massachusetts, Transcript, p. 1012) is, Massachusetts submits, immaterial. In order to make this allegation and evidence material it is necessary to assume for the sake of argument that Connecticut has proved conclusively substantial and presently threatened damage to the complainant State or its citizens.

The principal contention of Massachusetts is that Connecticut has not proved any substantial damage, and that this fact alone precludes any relief to Connecticut. However, if it be assumed that Connecticut has proved substantial damage, even then Massachusetts contends that Connecticut is not necessarily entitled to an injunction. This Honorable Court, sitting as an international tribunal and as a court of equity, has been accustomed to apply in inter-

state controversies equitable principles of comparative damage and of substitutional or conditional relief rather than specific or injunctive relief. Upon this assumption just made (that Connecticut has proved substantial damages), we submit that this Honorable Court would weigh the damage to Connecticut against the reasonable necessities of Massachusetts for a proper and acceptable water supply. We submit that, if such a balancing of interests becomes necessary, the evidence as to the existence of a supply of water in Eastern Massachusetts reveals clearly that, as the Special Master found (Rep. Sp. M. 39, 51-52), there is no reasonably adequate, acceptable, or satisfactory water supply there available for the use of the Metropolitan District about Boston; and that the result of granting an injunction will be to force Massachusetts to provide Metropolitan Boston with a grossly inferior and hazardous supply, causing a further diminution in the flow of Eastern Massachusetts streams, disastrous to the health and economic welfare of the community. The pleadings and the evidence also show, we submit, that the damage caused to Connecticut by denying an injunction would be trivial and insubstantial; that Massachusetts stands ready to pay full compensation for any actual damage caused by its project; and that every consideration of comparative damage should lead this Court to deny injunctive relief.

2. Massachusetts has Established, as the Special Master has Found, that There are Not Adequate Supplies of Pure Water in Eastern Massachusetts to Meet the Demands of the Population of That Region in the Future, and that it is Necessary to Obtain the Ware-Swift Supply Chosen by the Massachusetts Legislature after Due Deliberation. Connecticut has Not Shown that the Special Master was Incorrect in His Conclusion that Boston ought Not to be Forced to Adopt the Inadequate Schemes Suggested by Connecticut for Supplying the City with Hazardous Treated Water from Inadequate and Polluted Eastern Massachusetts Sources.

The general finding of the Special Master upon the suggestion of Connecticut that Boston should resort to inferior and polluted sources of water in Eastern Massachusetts has been summarized above.

At the hearings before the Special Master, as he found (Rep. Sp. M. 31), Massachusetts introduced evidence and exhibits (Exhibits D-13, D-32, D-34, and D-35) showing in detail what the water supply needs and available resources were; not only as actually existing in 1929, but as estimated for the years 1970 and 2000. Southeastern Massachusetts, including Cape Cod, was, as the Special Master found, regarded by both parties as self-sufficient and as having no more water available than the section would reasonably need within the fairly close future (Rep. Sp. M. 30; see Joint Sum. p. 217; Transcript, pp. 1586-1588). The estimates of the growth of population in Northeastern Massachusetts, made by expert witnesses called by Massachusetts, the Special Master (Rep. Sp. M. 31) found to be "within the reasonable probabilities." As a result of this estimated growth in population, Northeastern Massachusetts by 1970 will probably be faced with a deficit of 178 million gallons of water a day, which will have to be supplied from new sources not now used, even after use has been made of all of the available supplies of pure water in Eastern Massachusetts.

The Massachusetts evidence showed that the supplies set out on the following table were the only sources of water in Northeastern Massachusetts capable of use for the purpose of supplying that section with pure drinking water (1) without depriving Southeastern Massachusetts of its supply of water; (2) without going outside the boundaries of the Eastern watershed and into the watersheds of interstate streams, and (3) without making use of unduly hazardous and polluted supplies (see Rep. Sp. M. 31-32; Joint Sum. pp. 158, 160).

TABLE A.[1]

	1929	1970
Total population	2,860,000	4,572,000
Total million gallons a day water-supply resources:		
District (not counting Ware and Swift)	147	134
Local sources (of District Group)	61	38
Local sources (of outside groups except the Ipswich)	50	32
Ipswich River	70	70
Assabet River (emergency supply)	15	15
Total available sources	343	289
Total consumption requirements:		
District	197	373
Outside the District	47	94
Total requirements	244	467
Surplus*	99	
Deficit		178

[*Distributed over a number of independent communities with no connections making their surpluses mutually available.]

[1]Table A above, printed as it appears at page 31 of the Report of the Special Master, so far as it concerns water *consumption,* is based upon the evidence of water consumption

Connecticut then attempted to show that, besides the sources of water in Northeastern Massachusetts, testified to by witnesses called by Massachusetts, there were available the following sources (see Joint Sum. p. 160):

---

requirements tabulated in the Joint Summary of the Evidence at pages 158-159, top. The figures in Table A above showing water *resources* is based upon the evidence of witnesses called by Massachusetts tabulated in the Joint Summary of the Evidence at pages 159-160. The material in Table B (showing a tabulation of sources said by Connecticut witnesses to be available in addition to those supplies included in Table A) is obtained by analysis of the table printed on the middle of page 160 of the Joint Summary. The table last mentioned (Joint Sum. p. 160, middle) shows in million gallons a day the amount of water, in addition to supplies *now developed* by Massachusetts, which *Connecticut* witnesses said was available in Northeastern Massachusetts. By subtracting from 179 million gallons a day (the total yield of the Fifteen Watershed plan as testified to by Connecticut witnesses—see Joint Sum. p. 160, middle), 85 million gallons a day, the potential yield of the *undeveloped* Northeastern Massachusetts sources (Ipswich River, 70 million gallons a day; Assabet River emergency supply, 15 million gallons a day—see Joint Sum. p. 160, top) as testified to by witnesses called by Massachusetts, a figure of 94 million gallons a day is obtained. That 94 million gallons a day (as set out in detail in Table B) is the total amount of yield (from sources in Northeastern Massachusetts *other than* the Merrimack River) which Connecticut witnesses claimed was available in *addition* to *all* the sources in Northeastern Massachusetts said to be available by witnesses called by Massachusetts. This reconciliation of the tables set out in this brief and those set out in the Joint Summary at pages 159-160 shows clearly that the tabulations by the Special Master at pages 31 and 32 of his report were entirely correct.

TABLE B.

	Million gallons a day
Shawsheen River	30
Lower Sudbury River	27*
South Sudbury (in addition to that now used by Massachusetts)	17*
Assabet River (in addition to the 15 million gallons a day admittedly available as an emergency supply)	20
Total	94

[*By typographical mistake these two figures were transposed in the Report of the Special Master (Rep. Sp. M. 31-32).]

The Special Master found that these sources "will be insufficient to meet the 1970 probable deficit." Connecticut also urged that Northeastern Massachusetts could use water from the heavily polluted Merrimack River by treating it by a complicated process of storage, aeration, filtration, and chlorination. The Special Master ruled that Massachusetts ought not to be forced to use this objectionable and inferior source (Rep. Sp. M. 51-52).

The Special Master found that, by the enactment of the legislation authorizing the Ware–Swift project after a long and careful study of all possibilities, the people of Massachusetts had rejected the Eastern supplies, including the Merrimack River (suggested by Connecticut), as objectionable. The legislation and preceding investigations, the Special Master found (Rep. Sp. M. 30), "make a *prima facie* case that these supplies are inadvisable either because inadequate or unfit." The Special Master then considered Connecticut's "effort to show that this legislative determination is wrong," and came to the conclusion that the two schemes [suggested by Connecticut

for supplying Eastern Massachusetts with water from sources in addition to those which witnesses called by Massachusetts testified were available] were undesirable and objectionable. These two Connecticut schemes, which the Special Master found ought not to be forced on Metropolitan Boston were:

(*a*) The so-called *Fifteen Watershed* scheme, which proposed the accumulation of water from fifteen separate small water sources in Northeastern Massachusetts.

(*b*) The so-called *Merrimack River* scheme, involving the diversion of 200 million gallons a day of water from the highly polluted Merrimack River to augment the present Boston supply after extensive treatment of the polluted Merrimack waters.

In very brief form the basis of the Special Master's finding that Metropolitan Boston ought not to be obliged to adopt either of these schemes or any of their component parts was as follows:

Bases of Objection to the Fifteen Watershed Scheme.

1. The scheme will produce, according to the most optimistic statements of the Connecticut experts, only 94 of the 178 million gallons a day of the 1970 deficit (Rep. Sp. M. 32).

2. The scheme, involving the use of a number of small units, would be difficult to administer and operate, and is unsound from an engineering standpoint (Rep. Sp. M. 32-35).

3. It involves the use, to a large extent, of polluted waters, inferior, even when treated, to waters from a pure source like the Ware–Swift project (Rep. Sp. M. 34, 36).

4. The increasing population upon the watersheds involved in the scheme will result in increased pollution and greater difficulty in producing a pure water by treating the polluted waters (Rep. Sp. M. 36-38). There is a dis-

tinct possibility that it would be necessary to abandon these sources, if they were adopted, within a reasonable time in the future (Rep. Sp. M. 38-39).

5. Because of presence of swamps and pollution in the watersheds included in the scheme, the water furnished [even when treated] would be frequently objectionable to the public because of high color and tastes and odors. There is danger of disease from filter breakdown due to the presence of the human factor (Rep. Sp. M. 37, 38, 39).

6. It was left uncertain by the evidence whether this scheme, suggested by Connecticut, could be carried out without infringing on the reasonable requirements of certain Eastern Massachusetts mills for process water (Rep. Sp. M. 37-38).

Bases of Objection to the Merrimack River Scheme.

1. The raw water of the Merrimack River is highly polluted both by human sewage and industrial wastes (Rep. Sp. M. 40-41, 45, 52).

2. The intake of the proposed scheme would necessarily be directly south of the New Hampshire border. It would be impossible for Massachusetts to protect from pollution so much of the watershed of the Merrimack River as lies in New Hampshire; particularly as it is now practically "a legalized public sewer" (Rep. Sp. M. 40, 45-46, 52).

3. Because of the high degree of pollution of the Merrimack River the danger of filter breakdown would be an unusually great hazard; 100 per cent efficiency in filter and treatment plant operation would be impossible (Rep. Sp. M. 42, 43, 44, 52).

4. Certain industrial wastes found in the Merrimack River are unusually difficult to eliminate, and, even with the best modern methods of water treatment, cause objectionable tastes and odors (Rep. Sp. M. 43, 46; see also 41, 44, 52).

5. Pollution of the Merrimack River Valley will probably increase over a period of years as population grows and industry develops (Rep. Sp. M. 41, 43, 45, 47).

6. The available reservoir sites in Eastern Massachusetts are greatly inferior to the "ideal" site (Rep. Sp. M. 36) available in the sparsely settled valley of the Swift River. The whole project (suggested by Connecticut) of using the Merrimack water as a domestic supply is inferior from an *engineering* standpoint to the Ware-Swift project (Rep. Sp. M. 43, 52).

7. Public opinion, always an element of great importance in water-supply matters, renders the polluted Merrimack water objectionable as a supply (Rep. Sp. M. 47, 50-51).

8. It is a general principle of water-supply engineering that "where two sources are equally available, one polluted, the other clean, the clean water ought to be chosen" (Rep. Sp. M. 47). The Ware-Swift supply is much superior in quality to Merrimack River water (Rep. Sp. M. 52).

9. There is danger that the diversion from the Merrimack River proposed by Connecticut would, if carried out, cause an important and undetermined injury to present and future factories at Lowell and Lawrence, Massachusetts (Rep. Sp. M. 48, 52).

10. The interests of navigation on the Merrimack River are important enough to justify the conclusion that in times of low flow the diversion from that river proposed by Connecticut could not be carried out to its full extent, without the probability of a substantial reduction of it by the Secretary of War (Rep. Sp. M. 48-49, 52).

An additional objection to taking a supply from the Merrimack River is found in the testimony of Massachusetts witnesses that there would be a very real community damage to Lowell and Lawrence if the power plants in those cities were disturbed. No estimate in money of this

damage could be made, but every home-owner and merchant in those cities would be adversely affected, since the cities are built up around the water power of the Merrimack River (see Rep. Sp. M. 48; Transcript, pp. 1795-1796, 1836; Joint Sum. pp. 256, 243).

The Few Connecticut Exceptions to Findings of Fact on This Phase of the Case.

Connecticut has taken but four exceptions to the findings of fact of the Special Master upon so much of the case at bar as deals with the availability of supplies of water for Eastern Massachusetts (Exceptions numbered 58, 59, 66, and 67, pp. 27-28, 31-33). Two of these exceptions (Exc. Nos. 58, 59) are to the Special Master's subsidiary findings of fact as to matters in connection with the possibility of using the Merrimack River as a source of supply. One (Exc. No. 67) deals with the question of burden of proof, also raised by certain so-called "exceptions as to the law" (see Exc. Nos. 61, 62, 63, 64, 65, pp. 28-31). Exception No. 66 (Conn. Exc. p. 31) objects to the failure of the Special Master to find that, if the Ware–Swift project could not be carried out, Eastern Massachusetts could get some water somewhere. That Eastern Massachusetts could get an unsatisfactory and grossly inferior water in inadequate quantity is, of course, true; but the Special Master has found, in substance, that that region within its own limits could get no water of sufficiently adequate quantity and of good quality, safe, pure, and non-hazardous, which it ought to be compelled to drink instead of the Ware–Swift supply. This exception, therefore, is immaterial, since it in no way tends to dispute the propriety of the Special Master's finding that such polluted sources as could be obtained in Eastern Massachusetts are so inadequate in quantity, so inferior to the Ware–Swift supply, and subject to so many objections, that Boston ought not to be required to make use of them.

The Exceptions to Subsidiary Findings as to the Eastern Supply.

Exception numbered 58 (Conn. Exc. p. 27) deals with the Special Master's casual reference (Rep. Sp. M. 50) to the Lawrence water supply. The Special Master in substance found that public opinion in Lawrence is so strong against the use of Merrimack River water for drinking, that bottled water is used to an extraordinary extent. This finding was well warranted by the contents of a report [by agreement introduced in evidence, Transcript, p. 1363] on the Lawrence water supply prepared in 1916 by the firm of Morris Knowles, Inc., now retained by Connecticut (see Joint Sum. p. 230; Transcript, p. 1660). Mr. Jacobs of this firm was in fact the principal witness for Connecticut during the hearings. The following is an excerpt from the report:

> *"A Measure of Dissatisfaction.*
>
> "The value of an enterprise can often be estimated from the success of its competitors, and remarkably enough perhaps, such a criterion of worth is at hand, ready to be applied to the Lawrence water supply. We refer to the 'spring' water business in Lawrence. . . .
>
> ". . . Besides the municipal supply, however, Lawrence has still another source of water supply in the various bottled spring and well waters which are sold throughout the city. These waters . . . are peddled from house to house by some 15 different dealers at prices ranging from 3 to 5¢ per gallon. . . . The enterprise is of large proportions, so large in fact that it may be considered an important rival to the municipal supply. The total amount of spring water business in 1917 in Lawrence amounted to only a little less than $70,000 or 55 per cent of the average an-

nual revenue from all water consumers, of the Water Department itself.

"That this state of affairs is entirely abnormal is shown by Diagram M, wherein the consumption of spring waters per 100,000 population in Lawrence is graphically compared with that in a number of other cities. The diagram will show at a glance that the use of spring water per capita in Lawrence is many times that in any of the other five representative cities. There must be some reason for this striking contrast, and we believe the reason to lie more or less self-evidently in the dissatisfaction of the public with the municipal water supply."

Augustine X. Dooley, an attorney of Lawrence, Massachusetts, testified that since 1915 he has been a member of the Commission on Water Supply for the City of Lawrence, and that the sole function of this Commission was, and still is, to find a suitable supply of water for that city other than the Merrimack River (see Joint Sum. p. 230; Transcript, p. 1659). The reason for seeking a new source of supply was because of the fact that the water was taken from the polluted Merrimack River, that it was a "public sewer," and that the people of that city vigorously objected to drinking sewage even though it was treated (see Joint Sum. p. 231; Transcript, p. 1661). The feeling in Lawrence with reference to the use of the Merrimack River as a source of water supply is shown by the extremely large sale of spring water in that city as compared with the sale of such waters in other communities. Spring water is used in most of the public buildings of Lawrence (see Joint Sum. p. 231; Transcript, p. 1663). In the witnesses' opinion, the opposition of the people of Lawrence to the use of the water from the Merrimack River is as marked now as it ever was (Joint Sum. p. 233; Transcript, p. 1665).

These excerpts from the evidence show that the Special Master was thoroughly warranted in making the finding complained of in exception No. 58.

Exception No. 59 objects to the Special Master's findings that "The Merrimack River has thus become a legalized public sewer . . . There is no certainty of its improvement and no certainty that it will not become more polluted" (Rep. Sp. M. 45).

The excerpt from the report of the above-mentioned firm of Morris Knowles, Inc. (at a time when its members were serving in a responsible professional capacity), referred to by the Special Master (Rep. Sp. M. 47); the evidence of Mr. Barbour, quoted by the Special Master (Rep. Sp. M. 40-43); the comprehensive testimony of Mr. Eddy (Transcript, p. 2047 *et seq.*); all support the Special Master's finding. Mr. Eddy in substance testified that the discharge of sewage of the population on the drainage area of the river above Tyng's Island amounts to about 16½ million gallons a day, of which 11 million gallons a day comes from New Hampshire (Joint Sum. p. 278; Transcript, p. 2047), figures which he believes will be doubled by 1970. By way of illustration he said that at the present time there would be approximately two-thirds of a teaspoonful of sewage in a glass of water. Approximately 29 million gallons of industrial wastes per day are contributed to the river by industries in New Hampshire, and at the very dry weather flow, recorded in 1917, about one-fifth of the water of the river would have been comprised of industrial wastes (Joint Sum. p. 279; Transcript, p. 2049)—"a grossly polluted stream from the point of view of a water supply" (Joint Sum. p. 280; Transcript, p. 2057). "In other words," said Mr. Eddy, "in a tumbler full of river water about one-fifth would have been industrial wastes" (Joint Sum. p. 279; Transcript, p. 2049).

He further testified that in his opinion the Merrimack River will always be used as an industrial stream and that

it is inconceivable that the stream "will ever be cleaned up in the sense which we would expect in order to make it suitable for water supply purposes" (Joint Sum. p. 278; Transcript, p. 2042).

Mr. Eddy did state that the number of *bacteria coli* in the river had been decreasing in recent years (Joint Sum. p. 280; Transcript, p. 2058) for some unknown cause. He was inclined to attribute this reduction either to a temporary industrial depression in New England or to the discharge into the Merrimack River of some new, virulent, and powerful industrial waste which killed some of the intestinal organisms (Joint Sum. p. 280; Transcript, p. 2059). Mr. Eddy stated (Transcript, p. 2050) that he felt "very certain that the quantity of industrial wastes in the Merrimack River, where there is a large, abundant supply of water for industrial purposes, will increase in the future," and that he believed that they would at least double in forty years. Clearly, the Special Master was none too harsh in his description of the Merrimack River (following the testimony of Mr. Dooley, Joint Sum. p. 231; Transcript, p. 1661) as a "public sewer," with a doubtful future.

Exception No. 60 (Conn. Exc. p. 28) excepts to the failure of the Special Master to find that the water now furnished to the Metropolitan District about Boston should be treated. Although the exception seems immaterial, since it contains unfair allegations and innuendos, it must be mentioned briefly that it was the universal testimony of the witnesses that the present Boston water supply is an entirely satisfactory supply as to quality, safety, and management (see, *e.g.*, Joint Sum. pp. 270, 286; Transcript, pp. 2002-2003, 2090-2093). Boston has a very low typhoid record, according to the testimony of a witness called by Connecticut (Joint Sum. p. 205; Transcript, pp. 1148-1149). It is true that several witnesses stated that, purely as an extra precaution, they believed

surface-water supplies, including the Boston supply, should be chlorinated, as a guard against chance pollution in the storage and distribution system (Transcript, pp. 1105, 1898, 1982, 2003, 2152-2153). No witness suggested any present need of applying any of the complicated processes of aeration, coagulation, or filtration to the existing Boston supply or to the proposed Ware–Swift supply, all of which processes would have to be applied properly and continuously to make the polluted sources suggested by Connecticut safe (see, *e.g.*, Rep. Sp. M. 46).

The Special Master's General Findings of Fact as to the Superiority of the Ware–Swift Project and the Objections to the Eastern Sources Stand Unassailed by Connecticut.

The Special Master's general finding of fact (Rep. Sp. M. 39, 52) that both the Eastern schemes [the "15 watershed" scheme and the "Merrimack River" scheme] suggested by Connecticut for furnishing Metropolitan Boston with water involve water much inferior to the Ware–Swift water, stands undisputed by any Connecticut exception, as does the finding "that in many ways it is most advantageous to obtain a source of pure supply [*i.e.*, one which does not need complicated purification] wherever reasonably possible." In the face of these broad findings and of the findings (to which no exceptions were taken) as to the detailed objections to both schemes suggested by Connecticut (Rep. Sp. M. 33-52), it would seem conclusively settled that the Ware–Swift project is from every standpoint the best project for supplying Boston with a new supply, and that the only suggested alternatives are inferior, hazardous, and subject to a multitude of objections. It cannot be said, in view of the evidence quoted *verbatim* (Rep. Sp. M. 35-36, 37, 40-44, 47) by the Special

Master, that his findings were not well warranted. This being so, counsel for Massachusetts feel that they should not in this brief [already unavoidably long due to the multiplicity of the Connecticut exceptions] state at length the evidence as to the alleged Eastern supplies. It has been done by them in detail in the brief presented by Massachusetts to the Special Master [on file (bound in a green cover) with the clerk of this Honorable Court (see pp. 93-163)].

It is the contention of Massachusetts that—

(1) inasmuch as the Ware–Swift project will cause no substantial damage to Connecticut,

(2) since it is the safest and purest supply available, as well as being the most desirable from an engineering standpoint,

(3) because all other suggested supplies are hazardous, polluted, and subject to the danger of treatment breakdown, as well as many other objections specified at length in the report of the Special Master—the reasonableness and the necessity of resorting to the Ware–Swift project is established adequately. Confessedly, if the Ware–Swift project was of sufficient magnitude to cause Connecticut a very substantial damage, Massachusetts might perhaps be required to risk the health of its inhabitants by the use of inferior and polluted sources rather than to cause a great injury to a sister State. The doctrine of equality of right and of equitable division [as this Court has decided, notably in *Kansas* v. *Colorado*, 206 U.S. 46, 100 *et seq.*] would require in each instance that the needs of the State seeking to use water should be balanced on broad equitable principles against the possible damage to the State complaining of that use. Where, as in the case at bar, no damage to the complainant State (Connecticut) will be caused and the State seeking to use the water (Massachusetts) has a very real need of that water, the equities run decidedly in favor of Massachusetts.

The waters falling upon a State in the form of rainfall and running in the upland streams of a State are natural resources of great value to the State. Their primary use, as we have attempted to show above (see also Transcript, pp. 998, 1945), is, of course, for domestic water supplies. The fact that these upland waters are tributaries of interstate streams does not make them any less natural resources of the State in which they lie. Certainly the doctrine of equitable division should make a reasonable portion of them available for drinking and domestic use to the upstream State where the rainfall occurs, particularly when the use by the upper State does not substantially change the character or size of the interstate stream in the lower State. A 2% average annual diversion, taken almost entirely in times of high flow, cannot be said to be more than the fair share of the waters as to which Massachusetts can justly claim the right to make a complete appropriation, under the doctrine of equality of right and equitable division laid down by this Court and by international law.

This contention, it is submitted, disposes of Connecticut exceptions, numbered 68 through 74. All of these exceptions raise, in one form or another, the propriety of the action of the Special Master in giving consideration to various objections to the Connecticut suggestions of supplies of water in Eastern Massachusetts alleged to be available in addition to those shown to exist by Massachusetts witnesses. The decisions of this Court discussed above (see this Brief, part III) clearly lay down the proposition that, in deciding how waters shall be divided equitably as between sovereign States, considerations of comparative damage and necessity of every kind will be treated as worthy of investigation. It was, therefore, within the province of the Special Master, acting for this Court, to give such weight as seemed proper to him to the weaknesses and hazards of modern methods of water treatment

(see Rep. Sp. M. 40, 45-47); to consider how far increasing populations upon particular watersheds, rendering it impractical to use the waters found in these drainage areas even by filtration, will make abandonment of supplies imperative (Rep. Sp. M. 3, 37, 38, 39, 43, 45, 50); to consider how far the reasonable needs for water for industrial purposes made it necessary to maintain a minimum stream flow in Eastern Massachusetts streams (Rep. Sp. M. 37-38); to examine the history of water-supply investigation in Massachusetts and determine what weight should be given to the legislative rejection of the polluted Merrimack in favor of the pure Ware and Swift Rivers (Rep. Sp. M. 29-30, 50-51). The Special Master gave none of these elements controlling force [as suggested in Connecticut's exception numbered 73, p. 34], but regarded all of them as worthy of careful investigation.

Connecticut exception numbered 69 seems to be founded on a careless examination or misapprehension of the Special Master's Report. The possibility and necessity of abandoning existing supplies because of inevitable increases of pollution was considered by him (Rep. Sp. M. 38-39, 41, 43-44). The insinuations of fact in exception numbered 68 are equally unfounded. The Special Master did give careful attention to modern water-treatment methods and the weaknesses of those methods (Rep. Sp. M. 40-47).

The Exceptions as to Burden of Proof.

Several Connecticut exceptions were rested upon the contention that technically the burden was upon Massachusetts to prove that the taking of water from sources outside Northeastern Massachusetts was in fact necessary (see Connecticut exceptions numbered 61, 62, 63, 64, 65, 67, 70, pp. 28-33). Massachusetts (1) has shown by convincing evidence what sources of suitable water were available in Eastern Massachusetts (Rep. Sp. M. 31); (2) has

proved that these sources will be inadequate to meet the reasonable and expected demands of the region, in the near future; and (3) to meet the expected deficit, has adopted the Ware-Swift project for obtaining water from pure and uncontaminated sources—a project which will cause Connecticut no substantial damage. This proof establishes at least a *prima facie* case of necessity, as the Special Master found (Rep. Sp. M. 30). Connecticut has sought to prove that two other sources (in addition to those testified to by witnesses called by Massachusetts) were available (see Rep. Sp. M. 32). The Special Master has found that Connecticut has not overcome the Massachusetts evidence as to the many objections to these two sources (the *Fifteen Watershed Scheme* and the *Merrimack River Scheme*), objections which did exist, according to his careful findings [summarized above in this brief]. It should be remembered that no exceptions were taken to his findings of fact as to these objections. Massachusetts has thus sustained a burden of proof which probably technically was not upon her under the pleadings. Massachusetts pleaded (Reprint of Answer, pp. 30-31) that "unless a *suitable* supply of drinking water . . . is obtained by the City of Boston and the metropolitan area about said city, the inhabitants . . . will be subjected to great risks and menace from disease and epidemic, because of the lack of a *suitable* supply of *pure and unpolluted* drinking water, which can be obtained from no source within the Commonwealth [of Massachusetts] except from the watershed of the Connecticut River, as has been authorized in said legislation . . ." [*i.e.*, Mass. St. 1926, c. 375; Mass. St. 1927, c. 321; Reprint of Answer, pp. 36-80]. It is submitted that Massachusetts has made thorough and adequate proof of this proposition, for it has shown that the pure Eastern sources are insufficient and that all other Eastern Massachusetts waters are subject to grave hazards and to serious objections from the standpoint of sufficiency and quality.

Connecticut, in its reply, alleged affirmatively "that there now exists in the Eastern part of the Commonwealth of Massachusetts a full and adequate supply of water susceptible of use for a domestic supply for the Metropolitan District. . . ." The evidence offered in support of this contention made no attempt to show that any sources existed in Northeastern Massachusetts other than—

(1) Those testified to by witnesses called by Massachusetts (see Rep. Sp. M. 31; see *supra,* p. 137).

(2) Those included in the two objectionable and inadequate schemes put forward by Connecticut (see Rep. Sp. M. 32; see *supra,* pp. 139-140; see also footnote, pp. 137-138).

Summary of Water Supply and Demand Testimony.

The parties have agreed that the Massachusetts witnesses testified that the available sources in Northeastern Massachusetts are 343 million gallons a day *today* [of which 85 million gallons a day are not developed, leaving 258 million gallons a day presently and immediately available (Joint Sum. pp. 159, 160; see *supra,* p. 138)]. There is thus at present 258 million gallons a day developed and available to meet a present consumption demand of 244 million gallons a day. The parties have also agreed that the witnesses called by Massachusetts testified that in 1970 the resources available in Northeastern Massachusetts will have fallen to 289 million gallons a day to meet a consumption demand of 467 million gallons a day. In tabular form this evidence of witnesses called by Massachusetts shows:

Northeastern Massachusetts		1929	1970
Water resources			
presently developed	258		
presently undeveloped	85		
Total		343	289
Agreed water consumption demand		244	467

According to the evidence presented by Massachusetts, Northeastern Massachusetts will thus in 1970 face a deficit of 178 million gallons a day, without taking into account any yield from the Ware–Swift project.

The parties further agreed that the table appearing on page 160 of the Joint Summary shows the amount in million gallons a day which Connecticut witnesses testified and claimed was now available "in addition to the supplies now *developed* by Massachusetts" [italics ours]. These additional supplies, totaling 379 million gallons a day, were entirely comprised within the so-called *Fifteen Watershed* plan and *Merrimack River* plan. The additional supplies included 85 million gallons a day from sources (included within the Fifteen Watershed plan) which, as has been said above, witnesses called by Massachusetts said were available to Northeastern Massachusetts but were *not yet developed*. In tabular form these additional sources were:

	Million Gallons a Day
Fifteen Watershed Plan:	
Undeveloped sources said to be available by witnesses called by Massachusetts	85
Other sources in Fifteen Watershed Plan (said by witnesses called by Massachusetts not to be available)	94
Fifteen Watershed Total	179
Merrimack River Scheme:	
(Yield estimated by Connecticut witnesses)	200
	379

The affirmative proof by Massachusetts as to the objectionable nature of the above mentioned 94 million gallons a day, said by Connecticut witnesses to be available from the Fifteen Watershed scheme, and of the 200 million gallons a day alleged to be available from the Merrimack

River scheme, taken together with (1) the implicit agreement of both States that the two tables set out all possible sources of supplies in Northeastern Massachusetts and (2) Connecticut's failure to prove that the additional sources were sufficiently suitable to require Massachusetts to use them, fully warranted the Special Master's finding on this branch of the case. Massachusetts not only established a *prima facie* case, but substantiated that case by affirmative evidence which the Special Master believed. The proof of Connecticut, giving it "the utmost weight, no more than raises a doubt" in the mind of the Special Master (Rep. Sp. M. 51). Exceptions numbered 61-65, 67, and 70 should be overruled.

The Fundamental Consideration.

It should be remembered, however, that, in the case at bar, it has been found that the Massachusetts project will cause no substantial injury to Connecticut. That fact renders every other element of the case irrelevant and in itself should be enough to cause this Court to deny any relief in equity to Connecticut [under the principle of cases like *North Dakota* v. *Minnesota*, 263 U.S. 365, 374; see Rep. Sp. M. 7, 28-29].

Conclusion.

Massachusetts, therefore, contends that the Special Master's recommendation for a decree should be adopted, and that the bill of complaint should be dismissed without prejudice to Connecticut's right to apply for relief in the event that Massachusetts fails to comply with any orders and rulings of the War Department while they may be in force, or in the event that the terms of the present legislation or War Department findings are changed so as to authorize a further diversion. Massachusetts interposes no objection to the insertion in the decree of a condition requiring Massachusetts to pay $80,000 to the owner of the King's Island

power as soon as a 50,000 horse-power redevelopment is actually constructed at that place; such payment to be a payment on account for any damage which the owner of that redevelopment may seek to prove because of the Massachusetts project.

It is submitted that the following propositions, among others, have been proved:

1. The Special Master was correct in finding that the execution of the Massachusetts project will cause no material injury to Connecticut. In view of this finding, Connecticut is entitled to no relief in equity.

2. The Secretary of War has made valid and conclusive findings that the project will not interfere with navigation and by his action has protected all interests of navigation.

3. Massachusetts is not appropriating more than its fair share of the waters of the Connecticut River Valley. The project is proper under the principle of equality of right and equitable division.

4. The Special Master was entirely correct in finding that Metropolitan Boston ought not to be compelled to resort to inferior, dangerous, and polluted waters, inasmuch as much better pure waters are available without causing damage to Connecticut and without any inequitably large appropriation of waters from the headwaters of an interstate stream.

Respectfully submitted,

THE COMMONWEALTH OF MASSACHUSETTS,

By JOSEPH E. WARNER,
Attorney General of Massachusetts.
BENTLEY W. WARREN,
Special Assistant Attorney General of Massachusetts.
GERALD J. CALLAHAN.
R. AMMI CUTTER.

Of Counsel:

MANLEY O. HUDSON.

FILE COPY

FILED
DEC 29 1930
CHARLES ELMORE CROPLEY
CLERK

In the

Supreme Court of the United States.

OCTOBER TERM, 1930.

No. 12, ORIGINAL.

THE STATE OF CONNECTICUT

v.

THE COMMONWEALTH OF MASSACHUSETTS.

MASSACHUSETTS REPLY BRIEF IN OPPOSITION TO CONNECTICUT'S BRIEF IN SUPPORT OF THE EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER.

JOSEPH E. WARNER,
Attorney General of Massachusetts.
BENTLEY W. WARREN,
Special Assistant Attorney General.
GERALD J. CALLAHAN.
R. AMMI CUTTER.

ADDISON C. GETCHELL & SON, LAW PRINTERS, BOSTON.

SUBJECT INDEX

	Page
STATEMENT OF ARRANGEMENT OF BRIEF	1
DISCUSSION OF CONNECTICUT BRIEF	2

REFERENCES TO CONNECTICUT BRIEF

Page	4	2
	5	2
	6	2
	8	3
	9	3
	10	3
	12	4
	13	8
	14	9
	15	10
	16	11
	17	12
	21	15
	27	16
	28	19
	28-29	16
	32-33	16
	33-35	20
	37	21
	38-39	21
	39	21
	40	21
	41	22
	43-44	22
	46, 47	23
	49	23
	51	24
	52	24
	53	25
	56	25
	61	26
	62	26
	63	26
	64	26
	82	26
	83	27

	Page
Page 87	27
110	27
111	27
112	28
115	28
117, 119	28
125	28
130	30
131	30
136-137	30
138	31
140	32
142	33
144	35
145	36
146	37
147, 148	38
150	38
154-155	42
156	42
158	43
159	43
160	44
162	44
166	44
173	45
174	46
175	46
177-178	47
180	48
181	50
185-186	51
189	51
190	52
193	52
196	52
197	53
198	53
199	53
203	53
209	54

Page

Page 216-217 55
221 55
240 55

INDEX OF CASES

Clark v. Allman, 71 Kansas, 206 26
Elliot v. Fitchburg Railroad, 10 Cush. 191 26
Georgia v. Tennessee Copper Co., 206 U.S. 230, 237 31
Kansas v. Colorado, 206 U.S. 46 ..... 26, 31

STATUTE INDEX

River and Harbors Act of 1889, section 10 28

In the

Supreme Court of the United States.

OCTOBER TERM, 1930.

No. 12, ORIGINAL.

THE STATE OF CONNECTICUT

v.

THE COMMONWEALTH OF MASSACHUSETTS.

MASSACHUSETTS REPLY BRIEF IN OPPOSITION TO CONNECTICUT'S BRIEF IN SUPPORT OF THE EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER.

STATEMENT OF ARRANGEMENT OF THIS REPLY BRIEF.

For the convenience of the court the argument herein contained upon the principal brief filed by the State of Connecticut in support of its exceptions is set down under references to the pages of the Connecticut brief to which the argument is pertinent.

DISCUSSION OF CONNECTICUT BRIEF.

Connecticut Brief, p. 4:

The discussion of the pleadings contained in Connecticut's brief should be compared with that found on page 9 *et seq.* in the original Massachusetts brief in opposition to the Connecticut exceptions (hereinafter referred to as the "original Massachusetts brief").

Connecticut Brief, p. 5:

The last paragraph on the page purports to summarize the Massachusetts answer in one particular. A discussion of this paragraph of the answer will be found at pages 151 through 155 of the original Massachusetts brief.

Connecticut Brief, p. 6:

The statement in the last sentence of paragraph numbered 2 on page 6 of the Connecticut brief should be read in connection with paragraph 11 on pages 12 and 13 of the Reprint of the Answer, wherein Massachusetts concedes the binding authority of the Secretary of War and his findings (see also Reprint of Answer, pp. 6, 7, 8, 9).

Connecticut Brief, p. 6:

The summary contained in paragraph numbered 5 on page 6 of the Connecticut brief of certain portions of the Massachusetts answer is misleading. The allegations of the paragraph of the answer, which Connecticut purports to summarize, set up the facts and defenses discussed in the Massachusetts brief at pages 5 to 7, and at page 86 *et seq.* A careful and accurate description of the negotiations between the Metropolitan District Water Supply Commission of Massachusetts and the Secretary of War and the Chief of Engineers will be found at pages 6 to 9 of the

Reprint of the Answer (see also Appendix B, page 81; Appendix C, page 102, Reprint of Answer).

Connecticut Brief, p. 8:

No mention of the reply filed by Connecticut is made in the Statement of Pleadings in the Connecticut brief. This reply is discussed in Massachusetts brief at page 12 and at pages 151 to 155, especially page 153.

Connecticut Brief, p. 8:

Only scant mention of the Special Master's Report is made at this point by Connecticut. A careful outline of this report will be found in Massachusetts brief at pages 7 to 9, 12 to 16, and at 136 to 143.

Connecticut Brief, p. 9:

The first paragraph on this page purports to summarize certain legal contentions of Massachusetts as to the law applicable to this interstate controversy. These contentions of Massachusetts are set out fully in the original Massachusetts brief at pages 98 to 133, especially pages 98 to 114.

Connecticut Brief, p. 10:

It is submitted that the statement in the first paragraph on this page of the Connecticut brief is misleading. A full discussion of the provisions of the statute creating the Metropolitan District Water Supply Commission will be found in the original Massachusetts brief, pages 30 to 41. The statutes themselves are printed at length in the Reprint of Answer, at pages 36 to 80. The interpretation of these statutes made by Connecticut in this paragraph is erroneous (see Massachusetts Brief, pp. 30-41). The language of the statutes, read in the light of their legislative

history, shows that Connecticut is not warranted in trying to stretch the broad powers given to the Metropolitan District Water Supply Commission, to take such water rights as it must inevitably destroy in the execution of the Ware-Swift project, into an authorization to take waters for the purpose of supplying the Metropolitan District about Boston, even from other streams not in any way necessarily involved in the Ware-Swift project. It is perfectly obvious that the Massachusetts Legislature did not authorize the taking of any waters or water rights, except so far as might be necessary in accomplishing the diversion of the waters of the Ware and Swift Rivers, which diversions alone were specifically permitted in the two Acts found in the Reprint of the Answer (pp. 36-80).

Connecticut Brief, p. 12:

The first paragraph under the heading "Navigation" refers to the existence of navigation by pleasure and commercial craft between Hartford and Holyoke. For the one year of which statistics were in evidence, 1928-1929, no commerce was reported between these two points. The only navigation reported was one derrick and forty-six pleasure boats (Joint Sum. p. 49). The only substantial testimony as to navigation between these points was given by Captain Burgi (Joint Sum. p. 48 *et seq.*), who stated that he was the owner of a yacht which he sometimes used as a towboat in the rare instances when it was necessary to take pile drivers, dredges, etc., from Hartford to Springfield. He testified that there was no great volume of navigation between these points.

The third and fourth paragraphs under the heading "Navigation," on page 12 of the Connecticut brief, furnish an instance of the willingness of Connecticut to use *weekly average* figures of stream flow when it suits their convenience, and the stream flow figures for *individual*

days when they are beneficial. The reasons that average figures do not in every instance represent the exact situation to be expected when the Hartford gauge stands at a particular level are discussed fully at pages 49-51 of the original Massachusetts brief. The yardstick adopted by the War Department to determine when a release of additional water from the Swift River Reservoir would be necessary in the interest of navigation was the Sunderland gauge. Various elements enter into the situation, which make it impossible for that gauge accurately to reflect on every occasion the state of the river at Hartford. However, it seems to be the best index now in existence of normal flow conditions of the river. The Chief of Engineers so found in his recommendations as to the Swift River diversions (see Reprint of Answer, p. 97). The following quotation is pertinent: "The discharges of both rivers are affected and regulated to a considerable extent by mill and power dams which temporarily store water to suit occupational uses. The stage of the river at Hartford is indicated by a gauge at that point. The surface elevations are affected by tide and wind. The best information of normal flow conditions of the Connecticut River is afforded by the records of the United States Geological Survey gauge at Sunderland, Massachusetts, located on that river about as far above Hartford as the site of the proposed dam on the Swift River. Study of the gauge records indicates that critical stages normally occur between June 15 and November 15. The critical period for navigation is taken as from June 1 to November 30" (see also subparagraph (*d*) at page 99 of the Reprint of Answer).

Connecticut's exhibit (Exhibit C-41) purports to show that on a number of days in each year, even when the Hartford gauge is at 2.0 feet or less, there will be in fact a diversion instead of an increase in the flow of the river even under the War Department findings. This is to some extent true, merely because an average figure does not repre-

sent necessarily the situation to be found in every given instance. By the same token, however, on a number of days when the Hartford gauge stands above 2.1 feet there will actually be an increase in the flow of the Connecticut River because of the War Department findings. This variation from the average is due to the slight imperfection in the best available standard [the Sunderland gauge] for measuring the need of a discharge from storage on the Swift River. Connecticut was heard fully before the War Department, as the Chief of Engineers stated in his finding (see Reprint of Answer, p. 96, par. 7). Apparently Connecticut engineers were unable to suggest any better index of the need of a release of water from storage than the Sunderland gauge. The comparatively rare occasions in which there is a departure from the average situation are negligible in view of the fact that so many other elements than the Massachusetts project affect the stream flow of the Connecticut River at Hartford. Materially greater changes than those caused by the Massachusetts project might reasonably be expected because of the ponding of water behind the dam of the Northern Connecticut Power Company at Windsor Locks. Various witnesses called by Connecticut stated that the ponding over the week-end caused a very great decrease in the depth of the river (see Joint Sum. pp. 41, 46, 47). Even if a very much more substantial amount of water were to be released from the Swift River Reservoir immediately prior to this week-end ponding, it would have slight effect upon the height of the river at Hartford because of the intervening storage in mill ponds.

In considering the question of the effect of the War Department findings, it should be remembered that only a very small amount of the diversion proposed under the Ware-Swift project takes place during times of even moderately low flow. The testimony of Dr. Winsor, summarized at page 26 of the Joint Summary of the Evidence,

is highly pertinent. He stated "that the flow of the Connecticut River actually diverted by the Ware and Swift project under War Department restrictions averages about 2 percent; (1416) that the average annual flow of the Connecticut River at the Massachusetts-Connecticut state line corresponding to 17,000 cubic feet per second is 542.1 billion cubic feet per year; that the average net annual diversion under Massachusetts legislation as modified by the War Department is 10.8 billion cubic feet per year, corresponding to about 300 cubic feet per second; (1418) that of this 10.8 billion cubic feet, which is the net total annual diversion, 8.1 billion cubic feet, or three-fourths of the total, is taken away when the Hartford gauge reads above elevation 7.4 or 17.4 feet above project channel bottom; that 2.1 billion cubic feet, or nearly one-fifth of the total, is taken away when low tide on the Hartford gauge stands between 3.5 and 7.4 feet; (1419) that in other words, a total of 10.2 out of 10.8 billion cubic feet, or 94 percent of the total diversion, is taken out when low tide on the Hartford gauge stands above elevation 3.5, or 13.5 feet above the project channel bottom, leaving a balance of some six-tenths of a billion cubic feet of the total of 10.8 billion cubic feet, which is taken out when low water on the Hartford gauge is below 3.5 feet; that, however, if at any time low tide is below 2.1 on the Hartford gauge, which corresponds to 12.1 feet above the project channel bottom, the interests of navigation are safeguarded by the release of stored waters from the Swift River Reservoir under the requirements of the War Department, so that the navigable depth is slightly increased at times of lowest flow; (1420) that the amount of stored water which would be released under the War Department requirements, and which will increase the flow in the Connecticut River above what it would have been without any development of the Ware-Swift diversion project, averages about 146 million cubic feet per year, or three

one-hundredths percent of the average annual flow of the Connecticut River at the Massachusetts-Connecticut state line."

The testimony makes it abundantly clear that, on the average and so far as available methods make it possible, the Massachusetts project as modified by the War Department findings is designed to bring about:

1. the taking of as much water as possible from the Ware and Swift Rivers at times of high flow.

2. the taking of no water from the Connecticut River when the Hartford gauge is likely to be below 2.1 on the next day. [The best index of when this is likely to be has been found to be the Sunderland gauge.]

3. the taking of only a trivial proportion of the stream when the Hartford gauge is between 2.1 and 3.5.

4. the release of additional water from storage whenever the Hartford gauge is below 2.1. The inherent infirmity in the law of averages means that 100% perfection cannot be achieved. It is submitted that the variations from average not only will be unimportant, but will be caused by other elements than the Ware-Swift project, such as wind, tide, ponding, etc.

The contentions and arguments of Massachusetts in support of the finding of the Special Master that navigation upon the Connecticut River will not be affected in fact by the proposed Ware-Swift diversion as modified by the War Department findings will be found in the original Massachusetts brief at page 41 *et seq.*

Connecticut Brief, p. 13:

The Massachusetts arguments in support of the Special Master's finding that power on the Connecticut River within Connecticut will not be materially affected by the Massachusetts project will be found at page 63 *et seq.* of the original brief. The Special Master found [Rep. Sp.

M. 20-21, and no exception was taken to his finding] that "no present use of the waters for power purposes will be disturbed" (see Joint Sum. p. 54). The proposed diversion will not affect the *present* plant at all, and any suggestion (in the third whole paragraph on page 13 of the Connecticut brief) that it will is incorrect.

The arguments of Massachusetts with respect to the alleged injury to agriculture, which injury the Special Master found (Rep. Sp. M. 19-20) was not material, will be found at page 57 *et seq.* of the original Massachusetts brief.

Connecticut Brief, p. 14:

The arguments of Massachusetts in support of the Special Master's finding that no substantial decrease or increase of pollution in the Connecticut River will result from the execution of the Massachusetts project will be found at pages 52 *et seq.* and 73 of the original Massachusetts brief. There is no evidence which supports the statement in the Connecticut brief, p. 14, that "during portions of the year it [the river] passes the borderline between being an avowed nuisance and not" (see the discussion, *infra*, p. 33 *et seq.*). As stated in the original Massachusetts brief, the evidence showed that on each day, when Connecticut evidence tended to show that the oxygen content of the river at the Massachusetts-Connecticut state line was approaching its lowest point, there would have been an addition to the total amount of water in the Connecticut River at the state line because of the release of stored water from the Swift River Reservoir, if the Massachusetts project as modified by the War Department findings had been in existence on that day (see Original Massachusetts Brief, pp. 54, 73; see Exhibit D-4).

It is unquestionably true, as the counsel for Connecticut suggest on page 14 of their brief, that the water of the

Connecticut River at Hartford "is so highly polluted that it will be extremely difficult to make it available as a part of the water supply of the metropolitan district of Hartford." This statement is a clear recognition by Connecticut of the great difficulty of treating polluted waters like the Connecticut and Merrimack Rivers so that they will be safe to drink. There is no present project for supplying Hartford with water from the Connecticut River. In fact the undisputed testimony is to the effect that Hartford abandoned the Connecticut River as a source of water supply many years ago because of the danger from pollution (Joint Sum. pp. 88, 263). The only testimony which gave an indication that Hartford would ever consider using the Connecticut River was that of General Wadhams (Joint Sum. p. 146). That testimony was vague, and referred to the indefinite future. Massachusetts makes no contention that a polluted stream like the Connecticut River can or should be made use of for a domestic supply of water in its lower reaches at the present time. For many years all the states along this river have abandoned the main stream to sewage and industrial uses to a very large extent, as the Special Master indicated at page 23 of his report. As conditions change in the future all the states may well be forced into taking new precautions in connection with the disposal of sewage and waste, and the installation of modern sewage and waste treatment plants may possibly be a necessity.

In connection with the statements contained in the paragraph beginning at the bottom of page 14 of Connecticut's brief, reference is made to the arguments in the original Massachusetts brief, at page 56.

Connecticut Brief, p. 15:

The argument of Massachusetts in support of the Special Master's findings that fish life in the Connecticut

River will not be materially injured by the Massachusetts project will be found at page 71 *et seq.* of the original Massachusetts brief. The argument of Massachusetts in support of the Special Master's findings that the supplies of pure and suitable water in Eastern Massachusetts were approaching exhaustion will be found at page 134 *et seq.* of the original Massachusetts brief.

Connecticut Brief, p. 16:

The references to the first four paragraphs on page 16 of the Connecticut brief, to Exhibit C-1, C-2 and C-3, and to the 1922, 1925, and 1895 reports to the Massachusetts Legislature are hardly accurate. These reports refer to various waters in Eastern Massachusetts. With the exception of Exhibit C-2, these reports almost uniformly reject a very large number of waters in Eastern Massachusetts, which they discussed, as obviously unsuitable and unsatisfactory because of objections to the supplies; all of which objections were fully discussed and considered by the Special Master on the basis of evidence introduced before him (see Rep. Sp. M. 32-52). To the extent that Massachusetts in the present case admits that any undeveloped water supplies in Eastern Massachusetts are available, it was shown by the evidence that it is the intention of Massachusetts to develop these supplies fully for communities in the immediate vicinity of the sources thus said to be available (see *infra*, p. 12).

In the second full paragraph on page 16 Connecticut refers to a plan introduced in evidence by an engineering witness called by Massachusetts, providing for a use of the waters of the Merrimack and Ipswich Rivers in combination. This plan was introduced in evidence in a sincere attempt by Massachusetts to show that even a plan which obviated many of the objections to the two plans [discussed by the Special Master in his Report page 32 *et seq.*]

introduced in evidence by Connecticut, was open to such a vast number of objections that Boston and the Metropolitan District should not be obliged to resort to it. The witness who discussed this plan (Mr. Karl R. Kennison, designing engineer, Metropolitan District Water Supply Commission) indicated clearly that he would not consider the use of the Merrimack River unless "the Metropolitan District was *forced* to go to it for additional water" (Joint Sum. p. 244, italics ours). An examination of his testimony from pages 244 to 252 of the Joint Summary shows how unsatisfactory a water supply scheme he regards even this project for utilizing the polluted Eastern Massachusetts supplies. The direct quotation from the evidence, found at pages 252 to 253 of the Joint Summary, clearly reflects his attitude.

Connecticut Brief, p. 17:

The objections to the supplies of water said by Connecticut witnesses to be available in Eastern Massachusetts are fully discussed by the Special Master at pages 32 to 52 of his report. To his findings of *fact* with respect to these objections Connecticut has taken only trivial and inconsequential exceptions, as counsel for Massachusetts have pointed out at pages 143 to 151 of the original Massachusetts brief. These findings of fact, it is submitted, should therefore stand. The gross inferiority of the eastern supplies is so great that this Honorable Court should adopt the view taken by the Special Master.

The suggestion in the second full paragraph on page 17, that Massachusetts concedes that there are two sources of supply in Eastern Massachusetts available which have not yet been developed and which will yield 85 million gallons a day, is somewhat deceptive. These two sources of supply are discussed briefly in the original Massachusetts brief at page 137 *et seq.* and at page 153 *et seq.* They are the ***Assabet River***, where Massachusetts admits that there are

15 million gallons a day available as an *emergency* supply only, by the development of a number of very small watersheds in the headwaters of the Assabet River. The evidence of Mr. Kennison (Joint Sum. p. 251; Transcript, p. 1941) shows that this supply should be regarded only as an emergency supply because of the difficulty of developing the numerous small watersheds, because of the rapidly growing population in the area, which increases the danger of pollution, and because of the fact that approximately 50,000 people outside the Metropolitan District already take their water supply from that area. Similar testimony as to the danger of pollution of the supply because of the encroachment of population was given by Mr. Eddy (Joint Sum. p. 284). To those objections pointed out by Mr. Kennison, Mr. Eddy added the needs of the communities downstream for industrial purposes and for the minimum requirements of diluting even treated sewage and industrial waste (see also testimony of Mr. Goodnough, Joint Sum. pp. 220-221, 222-223).

The principal objection to the immediate use of the *Ipswich River* to supply the Metropolitan District about Boston with water is the fact that of the available 70 million gallons a day of yield from the Ipswich River, according to the agreed statement of water-supply demand in Northeastern Massachusetts by 1970, between 40 and 47 million gallons a day of this yield would be required for communities in the immediate vicinity of the river itself (Joint Sum. p. 159; see figures for "18 towns in Ipswich group"). Indeed it appears that the development of the Ipswich River as a water-supply source for the larger cities in Essex County has already begun. Two cities, Salem and Beverly, already take their supply from that source. Lynn takes a portion of its supply from the Ipswich, and study for further development is now in progress in accordance with the provisions of Massachusetts Resolves of 1927, chapter 30 [see Joint Sum. p. 227]. The Metropolitan

District by that time will be forced to go to other sources. It is obviously highly uneconomical for the Metropolitan District to develop a supply which it would have to surrender to nearby communities in a very short time (see Joint Sum. p. 227, bottom, to 228, middle; see Joint Sum. p. 248, bottom; Joint Sum. pp. 268 to 269). The Ipswich River supply is at best far from satisfactory because the water supply is limited and the quality is poor (Joint Sum. p. 227). The increased population of this area (see Joint Sum. pp. 228, 273, 283), the existence of a peat bottom to the only possible reservoir site (Rep. Sp. M. 52; Joint Sum. pp. 241 to 243; Joint Sum. p. 251, top), which would seriously affect the quality of the water, and the eventual need of abandoning the supply to the nearby communities (see Rep. Sp. M. 38-39, 49; see Joint Sum. p. 251), render this source of supply as a practical matter unavailable for the Metropolitan District about Boston. That district should not be compelled to develop such an uneconomical and temporary supply as a make-shift to postpone the Ware and Swift developments for only a short period of years (Joint Sum. pp. 250 to 251).

The suggestion in the fourth whole paragraph on page 17 of Connecticut's brief, that Massachusetts has permitted its eastern supplies to become polluted, is far from accurate. The Special Master properly found (see Rep. Sp. M. 23, 53 to 54; see page 56 of the Original Massachusetts Brief) that the practice in Massachusetts has not been different from that in all the eastern states. As a matter of fact Massachusetts has made strenuous efforts to clean up many of the eastern streams (see Joint Sum. pp. 220-223, 224-225, 277-278, 284-285). Most of the pollution of the eastern streams is inevitable because of the growth of population in the heavily populated districts in Eastern Massachusetts. So far as the Merrimack River [suggested by Connecticut as a possible source of water supply for Boston] is concerned, the pollution is to a very great ex-

tent outside the control of Massachusetts, because most of the watershed of the Merrimack River lies in New Hampshire. An examination of the Massachusetts exhibit (Exhibit D-20), inserted in the Special Master's Report opposite page 45, will show how true this is (see also Joint Sum. p. 234, and the discussion at pages 45 to 46, and the extract from the testimony of Messrs. Barbour and George Fuller at pages 40 to 44 of the Report of the Special Master).

Connecticut Brief, p. 21:

A full discussion of the acts of the General Court of Massachusetts under which the Metropolitan District Water Supply Commission is proceeding with the Ware-Swift project will be found in the original Massachusetts brief, at pages 43 to 51. The Acts themselves are contained in the Reprint of the Answer, pages 36 to 80. The statement in the last paragraph on page 21 of the Connecticut brief, to the effect that the amount of water taken from the Ware and Swift Rivers will provide the people of Massachusetts 205 million gallons a day, should be read bearing in mind the modification of the Massachusetts Legislation by the War Department findings. The diversion from the Ware and Swift Rivers as permitted by the Secretary of War will be sufficient to provide only 191 million gallons a day (see Rep. Sp. M. 5). This reduction in yield by the War Department findings is of course caused by the fact that the War Department findings require substantial increases in the normal flow of the Connecticut River during dry seasons by releases of water from the Swift River Reservoir. These releases of water already impounded reduce the average yield of the Swift River Reservoir supply to the Metropolitan District by 14 million gallons a day, this quantity being added to the low flows of the Connecticut River. The War Department findings

do not make possible any diversion from the high flows of the Swift and Ware Rivers in excess of that authorized by the Massachusetts Legislation.

Connecticut Brief, p. 27:

Paragraph (3) on page 27 of the Connecticut brief refers to a total capacity of the tunnels leading from the Ware River of 1900 million gallons a day. This total capacity refers only to a capacity to divert water *from the Ware River alone at the same time*, both east to the Wachusett Reservoir and west to the proposed Swift River Reservoir. At any time when these two tunnels were being used to capacity to take flood waters of the Ware River, both east and west, it would be impossible to divert any water from the Swift River Reservoir towards Boston (see Joint Sum. pp. 5-6; see discussion *infra*, pp. 16-19).

Connecticut Brief, pp. 28-29, 32-33:

As indicated in the principal Massachusetts brief (Original Massachusetts Brief, p. 29), Massachusetts contends that evidence as to what may happen thirty to forty years from now in the way of additional water supplies for Boston is immaterial in the present case. The Connecticut argument that the size of the present construction is excessive is, of course, an attempt to show a plan to divert additional water from the Connecticut River watershed in the distant future. The evidence of Dr. Winsor, Chief Engineer of the Metropolitan District Water Supply Commission (see Joint Sum. pp. 6-7), shows that the present construction is highly desirable from the standpoint of utilizing and obtaining all possible water available under the present project. The tunnel, now under construction, both so far as already built and if completed through to the Swift River, will not be large enough, according to Dr. Winsor, to take care of the flow which might be sent

through it under the following circumstances (Joint Sum. p. 6):

(1) When there is as high a flood on the Ware River as might reasonably be expected in the light of the records of floods since 1913, and on other similar watersheds prior to that date (Transcript, pp. 89, 207-208, 691).

(2) When the Wachusett Reservoir is full and it is desired to send Ware River water to the Swift River Reservoir to be stored at times of very high water on the Ware River watershed (Transcript, p. 691).

(3) When the Wachusett Reservoir has been drawn down to a very low point for cleaning or repairs and it is desired to send large quantities of water through the tunnel from the Swift River Reservoir in order to fill the Wachusett Reservoir rapidly (Transcript, p. 691).

(4) During the time when the plan for the temporary diversion of the freshet waters of the East and Middle Branches of the Swift River (see Joint Sum. pp. 6-7) is in force. Inasmuch as there would be no storage back of the temporary diversion dam on the Middle Branch, and as all water taken under the temporary project must be taken when a freshet on the Swift River is in progress, it is necessary to send immediately all water diverted under the temporary scheme through the tunnel to the Wachusett Reservoir. About 18% of the time the tunnel will not be large enough to take care of the water which could be diverted under this temporary project (Joint Sum. p. 7; Transcript, p. 697), particularly because, during the continuance of the temporary diversion, the tunnel from Coldbrook (on the Ware River) to the Wachusett Reservoir would have to carry the flood flows, not only of the Ware River, but also flood flows of the East and Middle Branches of the Swift River, as there would be no storage available for these waters except in the Wachusett Reservoir (Joint Sum. p. 7; Transcript, p. 698 *et seq.*).

After Dr. Winsor's testimony had gone into the case, particularly the testimony with respect to the temporary diversion (see Transcript, p. 697), no further evidence was introduced by Connecticut tending to show that Dr. Winsor's statement was in any respect incorrect, so that statement as to the necessity of having the tunnel the present size must, we submit, stand as uncontradicted in this case, in view of the fact that apparently none of the Connecticut witnesses, who testified before Dr. Winsor, had considered the case of the temporary diversion which will unquestionably affect a material saving in the cost of the Massachusetts project by permitting a postponement of the construction of the Swift River Reservoir (Transcript, p. 1966).

The evidence of Dr. Winsor contained in the Joint Summary of Evidence (Joint Sum. pp. 7-9) shows clearly that so far as the *size* of the proposed Swift River Reservoir is concerned, whatever determination may be made eventually by the Metropolitan District Water Supply Commission will be influenced largely by—

(1) The fact that very great additional size can be obtained for very slight additional expenditure (Joint Sum. pp. 8-9) particularly inasmuch as a very large amount of land, not actually to be flooded, will have to be acquired whatever the elevation of the flow line of the reservoir may be.

(2) The possibility of a greater degree of purification by storage in a large reservoir than in a small one.

In view of the testimony (Joint Sum. pp. 10-11) of Mr. J. Waldo Smith, for many years the guiding genius of the New York Water Supply projects (see Joint Sum. pp. 298, xliv), as to the desirability of large enough structures to ensure flexibility of operation and a conservation of supplies, counsel for Connecticut are hardly warranted in criticizing Massachusetts for making ample provision for a full development of the waters to the diversion of which

from the Ware and Swift Rivers the War Department does not object. This is particularly true in view of the attempt made by counsel for Connecticut to show (see Original Connecticut Brief, pp. 181, 185) that the Wachusett Reservoir (built to supply the Boston Metropolitan District in 1895) had not been made large enough to develop fully the watershed tributary to it.

Connecticut Brief, p. 28:

The power plant at the Wachusett end of the tunnel between Wachusett Reservoir and the Ware and Swift Rivers, referred to in paragraph (7) on page 28 of the Connecticut brief, is of course purely incidental to the primary purpose of the Swift-Ware project. The purpose of this is put very clearly in the original transcript of the evidence by Dr. Winsor. Counsel for Connecticut had been examining Dr. Winsor as to the state of progress of the plans for the development of power from the head of water created by the new tunnel. The Special Master asked the following question (Original Transcript, pp. 200-201):

> "The Master: Whatever you get from the power development, it has the effect of reducing the cost of the water?
>
> "The Witness: It does. It would be foolish for the Metropolitan District to fail to utilize the head of water created by the project so as to reduce the cost of water to the ultimate consumers. The water must travel from the Ware River and the Swift River, which are a considerable height above sea level, down to the City of Boston, which is substantially sea level. Although the water is needed to drink, it can materially develop power in such a way as to affect some saving in the expense of the project."

At page 56 of the Transcript Dr. Winsor said: "the only reason to generate the power is that energy has to be dissipated, and it is an economic way to dissipate it, and there is a market for what power you may be able to generate."

The above comment is, of course, pertinent also to the remarks contained in the Connecticut brief at page 31, paragraph 7 at the bottom of the page (see Transcript, pages 198 to 201).

Connecticut Brief, pp. 33 to 35:

The water supply demand figures, discussed at pages 33 to 35 of the Connecticut brief, are explained fully in the original Massachusetts brief, at pages 136 to 155, especially at pages 136 to 140 and 151 to 155. The Joint Summary of the Evidence, at pages 158 to 160, contains an agreed condensation of the evidence on this subject. The statement at the middle of page 35, that there is no intention to develop the Ipswich and Assabet supplies by Massachusetts, has been discussed above, *supra*, p. 12 *et seq.* While there is no intention to develop these supplies for the Metropolitan District, it is, of course, the intention of Massachusetts engineers to develop them for communities in Northeastern Massachusetts, outside the Metropolitan District, as rapidly as these communities need them. The eighteen towns in the Ipswich group alone will have a demand of 47 million gallons a day by 1970. This will consume a substantial portion of the water yield admittedly available in the Ipswich River valley. The whole of this yield will probably be required for the Essex communities by the year 2000. It is obviously not advisable for the Metropolitan District to develop this source, which it must surrender to nearer communities.

Connecticut Brief, p. 37:

With reference to the table set out at the bottom of page 37 of Connecticut's brief, it should be noted that this table sets out the estimated yield of certain water sources which the witnesses called by *Connecticut* testified was available. The witnesses called by Massachusetts pointed out a large number of objections to these sources, which were considered by the Special Master and are summarized and described by him at pages 32 to 52 of his report. To his findings of fact, as to these objections, Connecticut has taken only minor and trivial exceptions (see Original Massachusetts Brief, pp. 136 to 155).

Connecticut Brief, pp. 38 to 39:

The comment just made with respect to the table at the bottom of page 37 is applicable to the statement with respect to the 379 million gallons a day mentioned at the top of page 39. As to the 85 million gallons a day in the Ipswich and Assabet Rivers, which Massachusetts admits is available but is not developed, adequate comment has already been made (see *supra*, p. 12 *et seq.*).

Connecticut Brief, p. 39:

The heading in italics is not supported by the argument beneath it, and is incorrect (Joint Sum. pp. 276-277).

Connecticut Brief, p. 40:

The necessity of abandoning existing supplies of water in the future has been discussed in a number of places in the Connecticut brief. The undisputed testimony as to the tremendous growth of population in the suburban areas about the Metropolitan District, with the consequent inevitable increase of pollution, makes it abundantly clear why some sources now used in the Metropolitan Area will

have to be abandoned in the comparatively near future (see, for example, the testimony of Mr. Eddy, Joint Summary, pp. 283 to 284; the testimony of Mr. Barbour, Joint Summary, p. 269). It is just such increases of population as this which bring about the tendency toward the abandonment of polluted rivers in favor of pure upland supplies, mentioned by Mr. Barbour in the evidence summarized at page 263 of the Joint Summary.

Connecticut Brief, p. 41:

The quotation on the top of page 41 from Exhibit C-1 should, of course, be read in connection with the legislation in fact enacted in 1926 and 1927, subsequent to the date of the 1922 report. That legislation, as has been pointed out in the original Massachusetts brief, see pages 30 to 39, expressly excluded the Millers River from any diversion and gave no authorization, either express or implied, for any diversion from the Deerfield River.

Similar comment can be made with respect to the first whole paragraph on page 42 of the Connecticut brief.

Connecticut Brief, pp. 43-44:

If the evidence as to the "comprehensiveness of the present works" (now proposed by Massachusetts) was not introduced by Connecticut for "the purpose of anticipating future injury," there could be no conceivable basis for introducing the evidence. The Special Master (Rep. Sp. M. 52-53) properly disregarded the evidence as immaterial, particularly as no suggestion was made by any witness that any additional taking of water for Boston or the Metropolitan District from anywhere would be necessary after the completion of the Ware-Swift project until 1970 (see Joint Summary of Evidence, pp. 13-16). Dr. Winsor stated that a further supply would probably have to be available in 1970, and that the question of where it

should come from ought to be investigated ten to fifteen years earlier (see also Joint Sum. pp. 276-277). Even investigation of a new supply would not start for thirty years.

Connecticut Brief, pp. 46 and 47:

The Connecticut objection to the fact that the Massachusetts legislation authorizing a diversion from the Ware River refers to that diversion as "a diversion of flood waters" has been discussed fully at page 16 of the Massachusetts brief.

Connecticut Brief, p. 49:

The War Department findings with respect to the Ware and Swift diversions are discussed at length in the original Massachusetts brief at page 86 *et seq.* (see *supra*, p. 15).

The difference of 14 million gallons a day in *net average water supply yield* to Massachusetts from the project, as originally planned, and as modified by the War Department findings, is due almost entirely to the requirement of the Secretary of War that Massachusetts, during periods of low flow, make releases from waters impounded from the Swift River during high flows. So substantial is this low flow release that it reduces the net average yield of the project by the 14 million gallons a day, referred to in the first paragraph on page 49 of the original Connecticut brief. The Secretary of War finds that the diversions from the Swift and Ware Rivers at times when the Connecticut River at Hartford stands above 2.0 on the Hartford gauge will have no adverse effect upon the navigable capacity of the river (see Reprint of Answer, pp. 99-100).

The suggestion contained in the Connecticut brief, in the paragraph beginning at the bottom of page 49, has been discussed in the original Massachusetts brief, at pages 39 to 41.

Connecticut Brief, p. 51:

The statement in the last paragraph on page 51, as to the contention of Massachusetts with respect to the jurisdiction of the War Department, is absolutely unfounded. The position of Massachusetts is set out in the Reprint of the Answer at pages 6 to 9, especially in subparagraphs 5 (*a*), (*b*), and (*c*) on pages 6 to 7:

> "(*a*) that no . . . permit from Congress, the War Department, the Secretary of War, or the Chief of Engineers is necessary for the erection of any structures as such in a non-navigable river or stream.
>
> "(*b*) that the United States Government, the War Department thereof, the Secretary of War, and the Chief of Engineers have jurisdiction over the diversion of waters from non-navigable tributaries of navigable streams solely because such a diversion may result in the obstruction of the navigable capacity of a navigable stream into which such non-navigable stream may flow.
>
> "(*c*) that it is the duty of the Secretary of War and the Chief of Engineers to grant a permit for a diversion from a non-navigable stream, unless such diversion will result in an unreasonable obstruction of a navigable stream or will unreasonably alter or modify the capacity of the channel of a navigable water of the United States."

Connecticut Brief, p. 52:

The statement at the top of page 52, that Massachusetts has not accepted the recommendations of the War Department and that the Metropolitan District Water Supply Commission has not acted upon them, is directly contrary, not only to the statements of counsel for Massachusetts during the case, but also to the testimony of Dr.

Winsor, Chief Engineer of the Metropolitan District Water Supply Commission, summarized at page 25 of the Joint Summary of Evidence. This testimony was to the effect that the "Metropolitan District Water Supply Commission plans are being made in compliance with the War Department decision; that he is not intending to go beyond the requirements of the War Department." That Massachusetts is bound by the War Department requirements is, of course, fundamental (see argument Original Massachusetts Brief, pages 39-41).

Connecticut Brief, p. 53:

The argument of Connecticut, based upon figures of daily stream flow, discussed briefly by counsel for Connecticut at page 12 of their brief, and already commented upon in this brief (*supra*, p. 4 *et seq.*), is repeated by counsel for Connecticut at page 53 of their brief (see Original Massachusetts Brief, pp. 41-51, especially pp. 50-51).

Connecticut Brief, p. 56:

The findings of the War Department have only a very slight effect in modifying the amount of diversion by Massachusetts during periods of high flows on the Connecticut River and on the Swift and Ware Rivers. The floods usually occur during the spring or in the late fall, and so the time restriction preventing any diversion at any time from the Ware River during the period from June 15 to October 15 is not generally applicable. The War Department was interested solely in protecting the very low stages of the river from material reduction in height. Even during very high flows, the reduction in the height of the river, due to the Massachusetts project, would have reached as much as 6 inches (according to Complainant's Exhibits C-6, C-6A, and C-6B), only on two days during the period of sixteen years of which adequate stream flow statis-

tics are available. At times when the Hartford gauge stands at between 17 and 25 feet, the reduction in flow due to the Massachusetts project, as shown by these exhibits, probably would not average in excess of 4 inches.

Connecticut Brief, p. 61:

See discussion in the original Massachusetts brief, at pages 98 to 133.

Connecticut Brief, p. 62:

See discussion in original Massachusetts brief, at pages 121 to 133.

Connecticut Brief, p. 63:

With respect to the law which this Honorable Court has said is applicable in interstate cases, like the case at bar, see the original Massachusetts brief, at pages 98 to 121, especially 99 to 114.

Connecticut Brief, p. 64:

The statement (in the third whole paragraph on page 64 of the Connecticut brief) that Kansas recognized the "appropriation" theory of water rights is incorrect. This Court in *Kansas* v. *Colorado*, 206 U.S. 46, at page 103, relied heavily on the decision of *Clark* v. *Allman*, 71 Kan. 206, citing and quoting *Elliot* v. *Fitchburg R.R.*, 10 Cush. 191, at length, and applying in Kansas substantially the Massachusetts rule of water rights.

Connecticut Brief, p. 82:

The comments on the War Department findings on the first whole paragraph on page 82 of the Connecticut brief, based upon the use of figures for particular days, instead of weekly averages, should be considered in the light of

the argument contained in this brief (*supra*, p. 4). The same material should be considered in connection with the misleading statement that water is to be released from the Swift River Reservoir only when the Hartford gauge is at 2.1 feet or lower. This incorrect statement is found at the bottom of page 84, at the end of the top paragraph at page 85, and in the first whole paragraphs on pages 86 and 87 of the Connecticut brief.

Connecticut Brief, p. 83:

The argument on the facts as to the navigable capacity of the Connecticut River is answered in the original Massachusetts brief at page 41 *et seq.*

Connecticut Brief, p. 87:

The Connecticut contention based upon the *structures* which Massachusetts proposes to erect in the non-navigable Swift and Ware Rivers, is fully answered in the original Massachusetts brief at pages 90 to 92. It is submitted that the argument on the law beginning at page 92 of the Connecticut brief is fully answered by the argument contained at pages 74 to 98 of the original Massachusetts brief.

Connecticut Brief, p. 110:

As to the argument contained in the first paragraph on this page, see the original Massachusetts brief, at pages 40, 83, and 84. As to the Connecticut contention contained in the paragraph beginning at the bottom of page 110, see original Massachusetts brief, pages 77 to 84.

Connecticut Brief, p. 111:

The contention contained in the first paragraph on this page is discussed in original Massachusetts brief, pages 90 to 92.

Connecticut Brief, p. 112:

The interpretation of section 10 of the River and Harbors Act of 1899 is discussed in the original Massachusetts brief, pages 77 to 84.

Connecticut Brief, p. 115:

See original Massachusetts brief, page 90 *et seq.*

Connecticut Brief, pp. 117, 119:

Massachusetts makes no contention that rights, other than those affecting the public interest in navigation, are concluded by the War Department findings (see Original Massachusetts Brief, pages 97-98). It has been argued (Original Massachusetts Brief, page 41 *et seq.*) and the Special Master has found (Rep. Sp. M. 12, through 19), that the proposed diversion will not injure navigation in fact.

Connecticut Brief, p. 125:

The Connecticut argument on page 125, directed against Professor Weston Fuller's testimony, with respect to the value of the low flow releases from the proposed Swift River Reservoir to the proposed power redevelopment at King's Island, should be answered briefly. Mr. Jacobs testified (Joint Summary, p. 54) that the method of the developing of the proposed King's Island power project would be to build a dam further down the river than the present dam, thereby increasing not only the head of water, but, of course, the amount of water available in the pond behind the dam. The value of pondage for the purpose of storing water over the week-ends in times of low flow was testified to (Joint Sum. pp. 254-257) in most striking terms by Mr. Uhl, a consulting engineer of broad experience (see Joint Summary, p. xlvi). In water power

matters the purpose of pondage is, of course, to enable the concentration of a maximum amount of flow into the hours when it is most valuable. It is hard to see how any reasonable prudent business man could possibly undertake a water power development of the size of the suggested King's Island development unless a very considerable pondage was in fact available.

There is nothing in the evidence to indicate that Professor Fuller's assumption (quoted at the bottom of page 24 of the Connecticut brief), that sufficient pondage will be available to allow the drawing of water at high rate, is not correct.

A special instance, noted in the Connecticut brief, in the paragraph beginning at the bottom of page 125, is somewhat misleading. Though the records show that, on one day, November 18, 1924, there would have been a variation from the average situation to be expected under the War Department findings, none-the-less, during the whole week in which that day occurred, there would have been an average increase of 3 cubic feet per second due to releases from the Swift River Reservoir; during the previous week there would have been an average increase of 40 cubic feet per second due to release from the Swift River Reservoir. The effect of this average increase in the low flow of the river, due to the releases from the Swift River Reservoir, would, we submit, have been of advantage to the power company because they would have had more water available to store in the pond. [The Massachusetts project which, of course, was not in effect in November, 1924.]

The necessity of taking into account average figures over a short period of time, such as a week, rather than figures for individual days, has already been discussed in this reply brief (*supra*, p. 4).

Connecticut Brief, p. 130:

A casual reading of the first full paragraph on page 130 of the Connecticut brief would lead one to believe that the damage to power of $80,000, found by the Special Master (Rep. Sp. M. 21), was a recurring damage, amounting to that sum in each year. This, of course, is not true. The sum of $80,000 represented the capitalized (at 5%) average annual damage to power of $7900, adjusted for the credit representing the saving in capital investment due to the additional water at times of low flows (because of the releases from the Swift River Reservoir required under the War Department findings) [see Original Massachusetts Brief, p. 63 *et seq.*].

Connecticut Brief, p. 131:

The argument of Massachusetts in support of the findings of the Special Master, that agriculture in Connecticut will not be seriously affected by the Massachusetts project, will be found at page 57 *et seq.* of the original Massachusetts brief. Upon the conflicting evidence produced by Connecticut from her own witnesses, the Special Master has found that no substantial amount of injury will result from the comparatively trivial diversion of flood waters called for by the Massachusetts project (see Rep. Sp. M. 19-20). Assuming that, in a very small flood [the Hartford gauge standing at 17], when there would be at least 25 feet of water in the river (Joint Sum. pp. 23-24, see p. 76), the Massachusetts project reduced the depth of the river 4 inches (see Exhibit C-6, C-6A, C-6B), it would reduce the depth of the river at Hartford only slightly over 1% [4 inches out of 300 (25 feet)].

Connecticut Brief, pp. 136-137:

Although upon the evidence there can be no doubt that the spring floods do some benefit to the Connecticut hay

lands actually flooded, there was no convincing evidence tending to show that any substantial amount of land would not be flooded at all as the result of the Massachusetts project. The missing link in the chain of Connecticut's proof on this point is the complete absence of any reliable evidence showing that the diversion under the Massachusetts project of a portion of the very high floods would result in any material decrease in the amount of land actually submerged.

Connecticut Brief, p. 138:

It is submitted that counsel for Connecticut are endeavoring to push the quotation from *Georgia* v. *Tennessee Copper Co.* (206 U.S. 230, 237) to an unwarranted extreme. That case involved a suit by a *quasi*-sovereign state against a private corporation doing business in another state. It was not in any sense a pure interstate case like *Kansas* v. *Colorado*, reported in the same volume of the United States reports (206 U.S. 46). It is contended that this Honorable Court has laid down, not only in *Kansas* v. *Colorado* but in other similar cases [see the Original Massachusetts Brief, at page 106 *et seq.*], as the rule applicable to interstate cases like the case at bar, the doctrine of "equality of right" or equitable division. It is submitted that the rights of one *quasi*-sovereign state in an interstate stream are to be construed with reference to the equal and corresponding rights of all other *quasi*-sovereign states through which that stream passes. It is only reasonable, in territory like the New England states, where there are many congested urban areas, that each state interested in an interstate stream should be entitled under present circumstances to use a reasonable proportion of the waters of that stream for a domestic water supply in whatever portion of the state it desires, so long as it does not so substantially diminish the volume of flow of the river as

to make it impossible for other states further downstream to make a similar use of a portion of the remaining waters (see Original Massachusetts Brief, pp. 149-150).

Connecticut Brief, p. 140:

The arguments of Massachusetts in support of the finding of the Special Master, that the decrease or increase of the pollution of the Connecticut River due to the Massachusetts project would not be material, will be found in the original Massachusetts brief, at pages 52 to 57.

The statement in the first paragraph, under the heading "Pollution," on page 140 of the Connecticut brief, to the effect that "the quantity of domestic sewage and industrial waste which can be assimilated safely by any stream is in direct proportion to the percentage of dissolved oxygen in that stream," is highly misleading. Two principal elements must be taken into account in determining the capacity of any stream to assimilate sewage at any given point on the stream. These are (1) the dissolved oxygen present in the stream at the point in question, which represents a capacity to dissolve sewage; (2) the oxygen obtainable from the air and from tributaries by the stream in its progress to the sea from the point in question through re-aeration. The process of re-aeration on the Connecticut River is discussed at pages 54 to 55 of the original Massachusetts brief. Exhibit D-15, quoted at length (*infra*, p. 41), shows that during the very dry month of August, 1929, the Connecticut River at the state line had a population capacity [see, for definition of term "population capacity," Original Massachusetts Brief, pp. 52-53] to take care of the sewage of 368,000 people in addition to the people and industrial plants furnishing the sewage and wastes, of which the river was already taking care satisfactorily. By the time the river had reached Rocky Hill, below Hartford, and had received the whole sewage of the City of Hartford (because of the process of re-aeration), the ca-

pacity to dispose of additional sewage and wastes had increased to an ability to take care of the sewage of 816,000 more people than were then contributing sewage to the river. Re-aeration therefore is a potent factor which must be considered. It is neglected entirely in the first whole paragraph under the heading "Pollution" on page 140 of Connecticut's brief.

Connecticut Brief, p. 142:

At the bottom of the page reference is made to Dr. Winslow's testimony (Joint Sum. p. 92) to the effect that the Connecticut River at the state line, in the autumn of a fairly average year, is on the border line of nuisance. Dr. Winslow defines what he means by "border line" in his testimony, summarized at page 89 of the Joint Summary of the Evidence. In speaking about the first ten days of September, 1929 [when incidentally, if the Massachusetts project had been in effect, water would have been released from storage in the Swift River Reservoir, increasing the flow of the Connecticut River at the state line, see Exhibit D-4], Dr. Winslow says ". . . certainly *any substantial removal of oxygen* above that present [in the river] would during a period such as this have pushed the thing over the line, exhausted the oxygen completely and produced a real nuisance." More specifically (Joint Sum. p. 89, middle), he says that the river "during that ten days was in a border line condition and *any substantial removal of oxygen or water containing oxygen* would have thrown it completely over the line." (Italics ours.) It is apparent that in order to change present conditions so as to produce a nuisance there must be in Dr. Winslow's opinion what he calls "substantial removal of oxygen or water containing oxygen." What he calls a "substantial" removal of water containing oxygen is shown by the evidence quoted at page 90 of the Joint Summary of the Evidence and at pages 24

to 26 of the Report of the Special Master. Dr. Winslow, in the passage there quoted, certainly does not regard anything less than a 10% diversion as important.

It is also significant that Dr. Winslow refers to the Connecticut River at the state line as being on the border line of a nuisance in the "*autumn of a fairly average year*" (Joint Sum. p. 92). He bases these conclusions on the border line of nuisance on observations taken by him and by Dr. Rudolfs in the summer and fall of 1929, especially the first ten days of September. It is submitted that the summer of 1929 was an unusually dry period. It was not an "average" summer. From Exhibit D-36 one can obtain the number of days in 1929 and the average of seventeen years when the Hartford gauge stood at 2.0 feet or less at lower low tide. The figures for the year 1929 and the average for the seventeen-year period shown on this exhibit are as follows:

NUMBER OF DAYS WHEN THE HARTFORD GAUGE STOOD AT 2.0 OR LESS.

	1929	Average of 17 years
July	14	10.7
August	29	15.8
September	27	16.7
October	27	11.3
November	20	6.7
Total number of days	117	61.2

While it may be true that the total amount of water which flowed in the Connecticut River during the year 1929 "was very slightly below the average" (see Exhibit D-4), the period July to November, during which the Connecticut analyses were made, could hardly be considered slightly below the average dryness when the records show that the Hartford gauge recorded 2.0 feet or less on 117 days, as compared with the seventeen-year average of the

same period of the year of 61.2, an excess of 91% over the average.

On page 143, the second whole paragraph, the reference to 1929 as slightly below the average here appears expressly. It is submitted that our contentions above show Connecticut's statement to be incorrect. Incidentally during 1929 Exhibit D-4 shows that there would have been average weekly additions to the flow of the Connecticut River during that summer continuously from July 22, 1929, through and including the week beginning October 14, 1929. This period covers each of the individual days mentioned in the second whole paragraph on page 143, on which the Connecticut analyses found low figures of oxygen saturation. Had the Massachusetts project been in effect, the oxygen saturation would have been increased because of the discharge of additional water from the Swift River Reservoir in accordance with the War Department findings, although, as Dr. Winslow testified (Joint Sum. p. 90), it would probably have been impossible to detect the difference due to these increases or to diversion of a similar amount had it taken place by any methods of scientific analyses now known. The comments above (*supra*, p. 33) made as to what Dr. Winslow terms "border line of nuisance" are also applicable to the last paragraph of page 143 of Connecticut's brief.

Connecticut Brief, p. 144:

In view of the evidence of Dr. Winslow (quoted *supra*, p. 33, in the Report of the Special Master, pages 24 to 28, and contained in the Joint Summary of the Evidence between pages 89 and 95), it is submitted that the Special Master was clearly right in finding that the Massachusetts project as modified by the War Department findings will not in any important way either decrease or increase the pollution of the Connecticut River. The case at bar is not a case brought to abate pollution of the Connecticut

River. If it were, Connecticut would not come into court with clean hands (Rep. Sp. M. 23). There is no evidence that the stream has now become a nuisance, and, as we have shown above (*supra*, p. 34), even Connecticut witnesses testified that it will take at least a 10% diversion, even in very dry periods, to be detected.

Connecticut Brief, p. 145:

The second paragraph of page 145 of the Connecticut brief gives rise to an inference that Connecticut made observations daily and that Massachusetts made observations only once a month. As a matter of fact the Massachusetts monthly averages were compiled from samples taken in the following way: The observers employed by the Metropolitan District Water Supply Commission took samples on five days out of seven during the period from the latter part of September, 1928, to the close of navigation on December 17, 1928, and again from the time the ice went out in the early spring of 1929 until November, 1929, and during the balance of the time once or twice a week. Whereas Connecticut took samples daily during brief periods in 1928 and 1929, their work in general was confined to one sampling a day at each station, whereas Massachusetts sampling consisted of taking several samples at intervals of two hours (Joint Sum. pp. 121-122). In all, experts employed by Massachusetts analyzed over 4000 samples taken from the Connecticut River (Joint Sum. p. 123). It is true that the Massachusetts experts employed monthly averages in their testimony. Dr. Rudolfs confined his attention to particular days in which conditions were at their worst [and during all of which, if the Massachusetts project as modified by the War Department findings had been in effect, there would have been a release of additional water from the Swift River Reservoir]. The objective of the experts called by Massachusetts was to get data of such reliability that it could be

employed in prognosis, and to do so it was necessary to average a quantity of analytical material. While the data have been applied in Exhibit D-14 to average stream conditions during the period of the investigation, they can be applied equally well to similar stream conditions during any other year or period of time. For instance, the situation disclosed for August, 1929, would be expected on any day or hour when the stream flow had the value that it had during August, temperature conditions being similar. Exceptional variations from the average during individual days in determining the effect of the Massachusetts diversion upon the state of the river as regards pollution are of slight importance, inasmuch as those individual days must necessarily have been influenced very materially by special conditions absolutely unconnected with the project. So far as the project would have affected them, it would have been by a tendency to decrease the intensity of pollution.

The comments made (*supra*, p. 34) with respect to page 142 of the Connecticut brief, so far as it purported to treat 1929 as an average year, are applicable to the statements found not only in the fourth whole paragraph on page 145, but also to the similar statements in the second whole paragraph on page 156.

Connecticut Brief, p. 146:

There is no question that large sludge beds exist during the dry seasons in the Connecticut River above the Massachusetts state line. The oxygen content of the water at the state line represents the oxygen left in the river after the effect of the sludge beds above that point in the river has been exerted (see Joint Sum. p. 130). To some extent the sludge beds are a benefit to the river from the Connecticut standpoint, as Mr. Robert Spurr Weston testified (Joint Sum. p. 129). Since "while all the sludge beds have an oxygen demand, they use up the oxygen more slowly when they are on the bottom of the stream than if

they are suspended in the water . . ." He also pointed out (Joint Sum. p. 129) that the formation of sludge beds retards the amount of demand upon the oxygen in the river which might be created lower down if the material in the sludge beds were to go down stream during the summer months. When the higher flow occurs, and some of the sludge beds are taken away by a freshet, they do no harm because at such a freshet time there is plenty of water to supply all the oxygen demand created by the beds. There was no evidence that the sludge beds gave off odors or otherwise caused any nuisance, nor was there any evidence as to the effect of the Massachusetts project, as modified by the War Department findings, upon formation of sludge beds. The effect of that diversion is the issue involved in this case.

Connecticut Brief, pp. 147 and 148:

In discussing the subject of "bathing" on "water supplies," Connecticut introduced no evidence to show that the effect of the Massachusetts project would be to alter the present state of affairs in the Connecticut River for the worse. Dr. Winslow, in particular, was most specific in saying that a diversion or addition of water resulting in a "change of 5 per cent either way was not of practical moment" (Joint Sum. p. 93). There was no evidence, as we have pointed out above, of a present intention on the part of Connecticut to use the Connecticut River for a water supply anywhere (see *supra*, p. 10).

Connecticut Brief, p. 150:

Population capacity is defined accurately in the evidence referred to at pages 52 to 53 of the original Massachusetts brief. *Population capacity* is a scientific term used to express the ability of the stream at any given point, not only to take care of the pollution which it then contains and to

carry it to the sea without the production of a nuisance, but also its reserve capacity to take care of additional pollution without creating a nuisance. *Population capacity* thus is expressed in terms of the number of persons whose sewage could be taken care of *in addition to* the sewage already in the river at a given point. In the first paragraph on page 152 counsel for Connecticut fall into error when they say that if the population capacity is reached "there is no oxygen left." On the contrary, if the population capacity of the river at the state line were at any time reached, there would be enough oxygen in the river at the state line to carry all the sewage then in the river safely to the sea, regardless of any later re-aeration. The fact that considerable re-aeration takes place between the state line and a point below Hartford means that so long as the population capacity at the state line is not exhausted [and there is no evidence of any time when it has nearly been exhausted] the Connecticut River in Connecticut will not be a nuisance. In the third whole paragraph on page 152 it is stated that the present population *equivalent load* on the Connecticut River at the state line is 619,000 people. Of course the figure of 619,000 *equivalent load* above the state line has already been included in the analytical determinations upon which the *population capacity* (which is a *net* figure above the present population *equivalent load*) of the river at the state line is computed. This figure of population *equivalent load* also includes all the pollution contributed by Vermont and New Hampshire, which Dr. Rudolfs said was so far upstream that by the time it reaches the Massachusetts-Connecticut state line it has all been oxydized (Joint Sum. p. 106). In the second whole paragraph of the Connecticut brief, on page 152, some figures from Exhibit D-14 are printed. For the convenience of the court Exhibits D-14 and D-15 are here printed in full.

Exhibit D-14.

Summary of Computations from Analytical Data Showing Population Capacity of Connecticut River at State Line, and Estimated Effect of Swift and Ware River Diversions and Releases, as Authorized by the Massachusetts Legislation and as Modified and Restricted by the War Department Regulations.

POPULATION CAPACITY.

Month	(1) Capacity at State Line	(2) Capacity by Release or Diversion, Swift and Ware Rivers	(3) Net Capacity at State Line	(4) % Change	(5) % Change in Flow
1928					
Oct.	3,987,000	—59,000	3,928,000	—1.5	—1.3
Nov.	7,004,000	—85,000	6,919,000	—1.2	—1.2
Dec.	8,603,000	—135,000	8,468,000	—1.6	—1.6
1929					
Jan.	14,542,000	—327,000	14,215,000	—2.2	—2.2
Feb.	7,872,000	—194,000	7,678,000	—2.5	—2.7
Mar.	86,950,000	—2,175,000	84,775,000	—2.5	—2.8
April	144,760,000	—2,410,000	142,350,000	—1.7	—2.1
May	56,385,000	—1,018,000	55,367,000	—1.8	—2.0
June	2,368,000	—38,000	2,330,000	—1.6	—1.5
July	649,000	—6,000	643,000	—0.92	—0.62
Aug.	368,000	+5,000	373,000	+1.4	+0.90
Sept.	416,000	+4,000	420,000	+0.96	+0.75
Oct.	1,002,000	+8,000	1,010,000	+0.80	+0.57
Nov.	3,488,000	—14,000	3,474,000	—0.40	—0.30
Total	338,394,000	—6,444,000	331,950,000		
Average	24,171,000	—460,000	23,711,000	—1.9	—1.9

Note: Column (2) plus = release, minus = diversion.

Exhibit D-15.

Showing Relative Population Capacities of the Connecticut River at the State Line and Rocky Hill, Connecticut, under conditions prevailing from October, 1928, to November, 1929, inclusive.

POPULATION CAPACITY.

Year and Month	At Sta. 1 State Line	At Sta. 20 Rocky Hill
1928		
October	3,987,000	5,621,000
November	7,004,000	10,608,000
December	8,603,000	12,250,000
1929		
January	14,542,000	23,250,000
February	7,872,000	14,559,000
March	86,950,000	238,720,000
April	144,760,000	442,380,000
May	56,385,000	121,210,000
June	2,368,000	3,929,000
July	649,000	1,409,000
August	368,000	816,000
September	416,000	1,000,000
October	1,002,000	2,476,000
November	3,488,000	6,223,000

Average increase for 14 months = 157%

It will be observed that at every critical period included in the period covered by the exhibit (August, 1928, to November, 1929) the Massachusetts project as modified by the War Department findings, had it been in effect, would have added to the *population capacity* of the Connecticut River at the Massachusetts-Connecticut state line. Exhibit D-15 shows that at all times the *population capacity* at Rocky Hill, below Hartford, after receiving the sewage of Hartford was greater than the *population capacity* at the state line. This is of course due to the rapid re-aeration between the state line and a point just above Hartford. An examination of Exhibit D-14 also shows

how grossly misleading are the statements in the paragraph beginning at the bottom of page 152 and in the first whole paragraph on page 153. It is of course true that in times of very high flood, such as in April, 1929, the Massachusetts diversion, amounting to a 1.7% change in *population capacity*, would affect the *population capacity* of the stream by as much as 2,410,000 persons. However, at the time that this change would have occurred the *population capacity* of the Connecticut River at the state line was 144,760,000 people, a population capacity in excess of the total population of the United States including Alaska and the Insular Possessions [Population of Continental United States (1930) 122,775,046; estimated population of Alaska and Insular Possessions (1928) 13,601,059]. The lowest figure of *population capacity* shown on Exhibit D-14, that of 368,000 in August, 1929, does not indicate any serious condition. The river at the state line at that time could have cared for the sewage of 368,000 more people, and could have carried it safely to the sea without any allowance whatsoever for re-aeration. However, re-aeration would have exerted such an effect that *population capacity* even after receiving the sewage of Hartford would have been 816,000 at Rocky Hill.

Connecticut Brief, pp. 154-155:

The possible effect of the proposed new dam at King's Island is of course unknown. The evidence was conflicting, and properly so. The additional storage would probably improve the bacteriological situation, and even Dr. Rudolfs testified that the re-aeration would not be reduced more than one half (Joint Sum. p. 115).

Connecticut Brief, p. 156:

The paragraph labelled "b. During high flow" contains the same mistake as to the effect of the War Department

findings commented on *supra*, pp. 4-8. There is absolutely no evidence that the diversion during periods of high floods will in any way remove or diminish the scouring effect which the floods have upon the river. As to the comments on sludge beds, see *supra*, p. 37. With respect to the last paragraph on page 156, it is submitted that Dr. Winslow's statement, already referred to, as to complete inability by analyses to detect changes caused by the removal of 5% of the oxygen in the Connecticut River (Joint Sum. p. 90), covers the whole case on pollution, inasmuch as no other means of detection or observation can approach the sensitivity or accuracy of chemical analyses. Computations on Exhibit D-14 as to diversion from and additions to the flow of the Connecticut River are computations purely as a matter of mathematics.

Connecticut Brief, p. 158:

The statement at the bottom of the page, that the Special Master found that there was no indication that the policy of Massachusetts in permitting its streams to remain polluted will change, is completely in error. If he had made such a finding it would have been in error (see argument Original Massachusetts Brief, p. 56).

Connecticut Brief, p. 159:

The table of estimates introduced by Dr. Rudolfs as to the probable state of the Connecticut River was based upon conditions during an unusually dry summer like 1929 (during which the samples upon which Connecticut experts based their conclusions were taken). This is apparent from Dr. Rudolfs' testimony (Joint Sum. p. 106). As to the water policy of Connecticut as to pollution, see Massachusetts brief, p. 56.

Connecticut Brief, p. 160:

General Wadhams did not testify that all the available clean water resources of the state of Connecticut are already developed. There was no evidence that they were (Joint Sum. p. 143, see *supra*, p. 10). It is significant that General Wadhams testified that some Connecticut streams are so polluted as to be absolutely hopeless so far as cleaning them up is concerned (Joint Sum. pp. 148-150).

Connecticut Brief, p. 162:

The argument of Massachusetts in support of the Special Master's findings that fish life will not be injured by the Massachusetts project will be found in the original Massachusetts brief, at pages 71 to 74.

Connecticut Brief, p. 166:

The criticism of Exhibit D-12 by Connecticut is unwarranted. Dr. Winsor presented an analysis of certain Connecticut exhibits purely for the purpose of showing that they did not prove what counsel for Connecticut claimed that they proved (see Joint Sum. p. 157). The technique employed by Dr. Winsor to investigate whether or not there was any correlation between May floods and the shad run conformed to that commonly employed by statisticians. Instead of confusing the issue it actually results in the elimination from the problem of all the other variable factors referred to by counsel, and shows in the simplest possible way the entire lack of correlation between the two variables under study, that is, the shad run and the height of floods.

It is of course true that the waters between the Massachusetts-Connecticut state line and the Enfield Dam are in no way related to the shad industry, for it was in evi-

dence that the shad do not go above this dam (Joint Sum. p. 153). From the undisputed testimony it appears that all analyses of waters showing low dissolved oxygen content were of waters north of the Enfield Dam. Even with respect to these waters there was no evidence that any of the daily observers or investigators found any dead fish whatsoever during continued warm weather. It would be natural to suppose that, if the river became so bad as to be unable to support fish life, the presence of large numbers of dead fish would come to the notice of competent river observers.

Connecticut Brief, p. 173:

The argument of Massachusetts in support of the Special Master's finding that the available pure water supplies in Eastern Massachusetts are inadequate for the Metropolitan District about Boston, and for Northeastern Massachusetts generally, will be found at pages 134 to 155 of the original Massachusetts brief.

The criteria given by Professor Winslow as to the elements to be taken into consideration in determining whether water is available for use as domestic supply were more technical, and less inclined to take account of human weaknesses, than those of other experts called by Connecticut. The Special Master (Rep. Sp. M. 47) called attention to Dr. Winslow's academic adherence to pure theory as opposed to the reasonable consideration of practical matters by the other experts who testified, all of whom had had more direct contact with the construction and administration of water supplies than Professor Winslow. The uniform preference of all the other experts on both sides for pure upland streams, rather than polluted waters, as the original source of a water supply, leads one to suspect that Professor Winslow has allowed his belief in the theoretical perfection of modern treatment methods to become

somewhat of an obsession [see Dr. Rudolfs' testimony, Joint Sum. p. 188, Dr. Gregory's (called by Connecticut), Joint Sum. p. 199, Mr. Jacobs', Joint Sum. p. 179; see also the opinion of experts called by Massachusetts: Mr. Goodnough, Joint Sum. p. 228 *et seq.*, Mr. Howard, Joint Sum. p. 234, Mr. Sullivan, Joint Sum. p. 236, Mr. Kennison, Joint Sum. pp. 252-254, Mr. Sanborn, Joint Sum. p. 258, Mr. Barbour, Joint Sum. p. 267, Mr. Weston Fuller, Joint Sum. p. 276, Mr. Eddy, Joint Sum. p. 288, Mr. George Fuller, Joint Sum. p. 291, Mr. J. Waldo Smith, Joint Sum. p. 299].

Connecticut Brief, p. 174:

The discussion of the legislative reports in the Connecticut brief, p. 174 *et seq.* should be compared with the discussion in the original Massachusetts brief, at page 34 *et seq.*

Connecticut Brief, p. 175:

The quotation at the bottom of page 175 of the Connecticut brief, from Exhibit C-3 (the 1895 Report), is misleading because it is only a partial quotation. Immediately following the statement quoted appears the following language in the report:

> "The estimated cost of filtering and conveying this water to the metropolitan district is $17,500,000; but in the opinion of the Board it will be better to pay 10 per cent. more for a supply from a source that has not been polluted. The experiments carried on by this Board for a succession of years at an experiment station in Lawrence under the immediate direction of H. F. Mills, C. E., a member of this Board, and the filter constructed in connection with the water works of that city, have shown that waters as polluted as those

of the Merrimack can be effectually filtered and rendered safe for domestic use; but it is also true that filtering areas require continuous care on the part of the well-trained attendants, and that, in a few instances at least, inefficient administration or inherent defects of construction have allowed disease germs to pass through filters which were assumed, by good authority, to be a sufficient protection."

See also the evidence of the Massachusetts experts quoted at length by the Special Master, and obviously relied upon by him (see Rep. Sp. M. 39-52).

Connecticut Brief, pp. 177-178:

The quotation from Exhibit C-1 at the bottom of page 177 is not, as one would assume from reading the Connecticut brief, from the report of the Commission itself, but it is a statement of an engineer employed by them. In the portion of the report (Exhibit C-1, p. 16) written by the Commission itself the following statement is made:

"The Assabet River was suggested in 1895 as the source from which the first additional supply should be taken, but the conditions have so changed meantime, due to the industrial development along the course of the stream, that it will not be wise to consider the use of this water as a possible regular source of supply. Yet inasmuch as the aqueduct from the Wachusett Reservoir passes through this watershed, the Assabet water could be readily diverted into it and used in case of a serious emergency. In fact, such an available emergency supply is an asset which should not be overlooked, as it will enable the district to follow safely a somewhat more conservative policy in regard to future extensions of the works than would otherwise be the case."

Similarly, the quotation from page 169 of the same report, found at the bottom of page 178 and the top of page 179, is incomplete in that it fails to include the following statement from Exhibit C-1, pages 169 to 170, which seriously modifies the effect of the passage quoted in the Connecticut brief:

> "The advisability, as a general policy, of limiting the amount of water that may be diverted from the rivers of the state so as to prevent serious diminution of their flow, especially at times when the flow is small, will hardly be questioned at the present time.
>
> "With conditions as they now are, if water is to be taken from streams in the Assabet watershed as proposed, the taking should be a limited one" (see Exhibit C-1, pp. 169-170).

This passage shows that only absolutely necessary attention was being given to the need of downstream communities for a minimum amount of water for dilution purposes.

Connecticut Brief, p. 180:

The passage quoted, at the top of page 180 of the Connecticut brief, from page 160 of Exhibit C-1, is followed by several pages in that exhibit of various objections to taking the waters of the Merrimack River. These objections are summarized by the engineer of the Commission as follows (Exhibit C-1, pp. 162-163):

> "But the most important of all, the taking of water from the Merrimack River would supply the Metropolitan Water District from a polluted source which is gradually and surely growing worse. The objections to this scheme in 1895 were summed up by the chief engineer of the Board at that time, as follows:—
>
> " 'Of these two plans, I have no hesitation in recommending the one for taking water from the Nashua

River, mainly because I believe that the small advantage which the Merrimack River plan has in regard to cost does not outweigh the disadvantage of taking a water which requires purification to make it suitable for drinking. Even if it were admitted that sand filtration with scientifically constructed filters and intelligent management will entirely remove disease germs from water, there is still the chance in the administration of a work of this kind that the preparation may be unscientific and the management unintelligent, which may cause the water to be either imperfectly purified by filtration, or, by accident, carelessness or the necessity of maintaining the supply, sent to the Metropolitan District without any filtration whatever. There is another objection to the Merrimack scheme which I regard as of importance,—that there is a greater danger that the supply may be interrupted through some accident at the pumping stations or filter beds, or by a temporary failure of the supply of coal or of skilled labor required to operate the works . . .'"

Regarding the use of the Merrimack River for a water supply by the cities and towns in the Merrimack River Valley (Exhibit C-1, p. 26), the Joint Board says:

"A report made for us by Mr. H. W. Clark has shown the feasibility of filtering the water of the Merrimack River above Lowell, but there are sufficient reasons against the use of this supply. At the present time this is known by the attitude of the citizens of Lawrence against their present supply taken from the Merrimack River above that city. Even though the water be rendered safe for use by the processes of filtration and chlorination, the citizens have repeatedly expressed repugnance against the use of a stream so

heavily polluted, when it is possible for another source of supply to be obtained."

The last sentence of the second quotation appearing on page 180 of the Connecticut brief, suggesting that an almost inexhaustible supply of water for the Metropolitan District would be furnished by the Merrimack River, is clearly contradicted by the strong evidence of Mr. Kennison (Joint Sum. p. 244), Mr. Barbour (Joint Sum. pp. 275-276), and Mr. Weston Fuller (Joint Sum. p. 273). The fact that there is no adequate storage for the Merrimack River, the fact that restrictions of the War Department may cut down the yield, and the essential requirements of downstream communities for a minimum amount of water in dry seasons to dilute inevitable pollution, all render the amount of yield to be obtained from the Merrimack River purely speculative. This subject is fully discussed in a brief filed by Massachusetts before the Special Master, copies of which are in the possession of the clerk of this Honorable Court. [The brief referred to is bound in green (see pages 110-120 thereof).]

Connecticut Brief, p. 181:

The argument of counsel for Connecticut to the effect that Massachusetts is reprehensible because water has been wasted in the past because the Wachusett Reservoir was not large enough to hold all that could have been obtained from the watershed tributary to it is strangely inconsistent with the argument of counsel for Connecticut that Massachusetts is now proposing to build too large a reservoir on the Swift River. One of these two arguments must fall. The contentions in the Connecticut brief, at pages 181 to 183, are in themselves abundant proof that the Swift River Reservoir should be made thoroughly adequate in size.

Connecticut Brief, pp. 185-186:

It is significant that Mr. Hazen, in the 1925 report (Exhibit C-2; discussed in the Original Massachusetts Brief, at page 38 *et seq.*), was forced to resort to a recommendation of the Ware River flood waters in order to obtain an adequate yield for the Metropolitan District of Boston. His recommendation included a very large taking from the Ipswich River, which, as we have shown above (*supra*, p. 12), would only be a make-shift because of the future needs of Essex County communities. The suggestion at the top of page 180 of Connecticut's brief, that Mr. Hazen's recommendation of a compensating reservoir on the Ware River was for the purpose of maintaining the flow of the Connecticut River, is absurd. The diversion of a few of the upland waters of the Ware River would certainly have had no appreciable effect upon the Connecticut River. The purpose of the compensating reservoir was to benefit the mills on the Ware and Chicopee Rivers. The attention of the Court is called to the fact that the Massachusetts Legislature rejected the recommendations of this report.

Connecticut Brief, p. 189:

As we have shown above (*supra*, pp. 11-12), the scheme for obtaining a supply from the Merrimack, in conjunction with the Ipswich, testified to by Mr. Kennison (Joint Sum. p. 244), was introduced by him purely for the purpose of meeting so far as possible obvious and serious objections to the scheme which the Connecticut experts had been advocating and for the purpose of showing that, even were these objections met, the best possible scheme for making use of the waters of the Merrimack River would be an exceedingly bad and dangerous water supply scheme (Joint Sum. p. 243 *et seq.*). Mr. Kennison perfectly obviously regarded this scheme as a last resort for Metropolitan Bos-

ton, and one to be utilized only under the most rigorous compulsion.

Connecticut Brief, p. 190:

The suggestion in the Connecticut brief, in the last paragraph on page 190, that the Knowles' report is out of date, is hardly true. It was brought up to date by Mr. Dooley's testimony (see Original Massachusetts Brief, p. 145; see Joint Sum. pp. 232-233).

Connecticut Brief, p. 193:

The Lawrence supply, which is now taken from the Merrimack River, is treated by slow sand filtration. That method, which is exceedingly expensive, is apparently the most satisfactory way of treating waters very heavily polluted with industrial wastes. Mr. McCarthy's evidence (see Joint Sum. p. 239) shows that a modern mechanical (or rapid sand) filter on occasions would not work with Merrimack River water. Despite the fact that the experimental station had every device known to water purification science at its disposal, there were long periods when it was found impossible to filter Merrimack River water because they were unable to obtain satisfactory coagulation, an essential step in mechanical filtration. Mechanical filtration was the method suggested by Connecticut experts for the proposed purification of the waters of the Merrimack River (see Joint Sum. p. 166).

Connecticut Brief, p. 196:

The testimony of Mr. Howard as to the policy in New Hampshire makes it clear that there is no reasonable probability that New Hampshire will adopt a different policy of protection and conservation of its streams in the near future (Joint Sum. p. 234; compare Connecticut brief, pp. 161-162).

Connecticut Brief, p. 197:

The intercepting sewers, referred to in the middle of page 197 of the Connecticut brief, would of course have no effect on improving the state of the Merrimack River, as regards pollution at Tyng's Island, above Lowell, the point at which it was suggested by Connecticut that Boston should obtain water from the Merrimack River. The quoted statement of the Special Master (from page 45 of his report) is directed to a consideration of the pollution content of the water at Tyng's Island and had nothing to do with the water at any point nearer the sea than Tyng's Island.

Connecticut Brief, p. 198:

With reference to Mr. Eddy's testimony, see the arguments contained in the original Massachusetts brief, at page 147.

Connecticut Brief, p. 199:

The evidence shows that the water power at Lawrence and Lowell is significant "in comparison with the capacity of" steam power plants at those points (see Joint Sum. p. 182). The installed steam power at Lawrence is approximately 75,000 horsepower, as compared with 25,000 horsepower of installed water power. At Lowell the steam power is only 25,000 horsepower, as compared with installed water power of nearly 30,000 horsepower.

Connecticut Brief, p. 203:

The statement at page 203 of the Connecticut brief, that a sanitary survey of the Merrimack River reveals nothing in New Hampshire in the drainage area as far north as Concord, New Hampshire, that would be objectionable or impossible to treat, is erroneous. Beside the general testi-

mony of Mr. Barbour quoted in the report of the Special Master, pages 40 to 43, must be considered the testimony of Mr. George Fuller (Joint Sum. p. 294) as to the dangerous phenol and gas wastes at Manchester, and as to the wood pulp mill at Lincoln. In addition to Mr. Eddy's striking testimony (summarized Massachusetts Brief, p. 146, Joint Sum. p. 278 *et seq.*) as to the industrial waste content of the water at Tyng's Island, there is the specific testimony of Mr. Howard, Chief of the Division of Chemistry and Sanitation of the New Hampshire Board of Health (found in the original transcript, though not set out in full in the Joint Summary), as to the existence of gas works and other manufacturing plants at Concord, Nashua, and Manchester (see Transcript, pp. 1687, 1688, 1689). The difficulty of treating pulp and phenol wastes is described by one of Connecticut's own witnesses, Major Whitman (Joint Sum. pp. 191-193), by Mr. George Fuller (Joint Sum. p. 294), and by Mr. Barbour (Joint Sum. pp. 262-264). Although Lincoln is north of Concord, New Hampshire, the influence of the wastes from the pulp mill in that town would make the filtration of Merrimack River water at Tyng's Island very difficult.

Connecticut Brief, p. 209:

It would seem that, instead of the modern trend of water treatment being toward the adoption of the filtration of polluted waters, the modern trend was toward obtaining pure upland water sources wherever that was possible. The situation in Albany was described by Mr. Whitman, an engineer called by Connecticut (Joint Sum. p. 193). We have mentioned (*supra*, p. 45) the preference of all the experts except Professor Winslow for upland supplies wherever those are available [see especially the testimony of Mr. Barbour at page 263 of the Joint Summary of Evidence].

Connecticut Brief, pp. 216-217, 221:

As to the subject of the burden of proof, see the discussion in the original Massachusetts brief, at page 151 *et seq.*

Connecticut Brief, p. 240:

In considering the reference, in the last paragraph of this page of the Connecticut brief, as to the scheme put forward by Mr. Kennison, see the argument, *supra*, p. 11.

Respectfully submitted,

JOSEPH E. WARNER,
Attorney General of Massachusetts.

BENTLEY W. WARREN,
Special Assistant Attorney General.

GERALD J. CALLAHAN.

R. AMMI CUTTER.

Office Supreme Court, U. S.
FILED
MAY 17 1930
CHARLES ELMORE CROPLEY
CLERK

FILE COPY

Supreme Court of the United States

No. 12 Original, October Term, 1929.

STATE OF CONNECTICUT,

Complainant,

vs.

COMMONWEALTH OF MASSACHUSETTS,

Defendant.

REPORT OF CHARLES W. BUNN, SPECIAL MASTER.

Supreme Court of the United States

No. 13 Original, October Term, 1929.

STATE OF CONNECTICUT,

Complainant,

vs.

COMMONWEALTH OF MASSACHUSETTS,

Defendant.

REPORT OF CHARLES W. BUNN, SPECIAL MASTER.

December 2, 1929, the Court appointed the undersigned as Special Master with power to summon witnesses, issue subpoenas, and to take such testimony as might be introduced and such as he might deem necessary to call. The Master was directed in the order to make findings of fact and conclusions of law and to submit the same to the Court with all convenient speed, together with his recommendations for a decree.

Accordingly the Master between February 18 and March 21, 1930, at Boston and at Hartford took such testimony as the parties introduced and found no occasion to call other witnesses.

In accordance with said order the Master herewith presents his findings of fact and conclusions of law with recommendations for a decree.

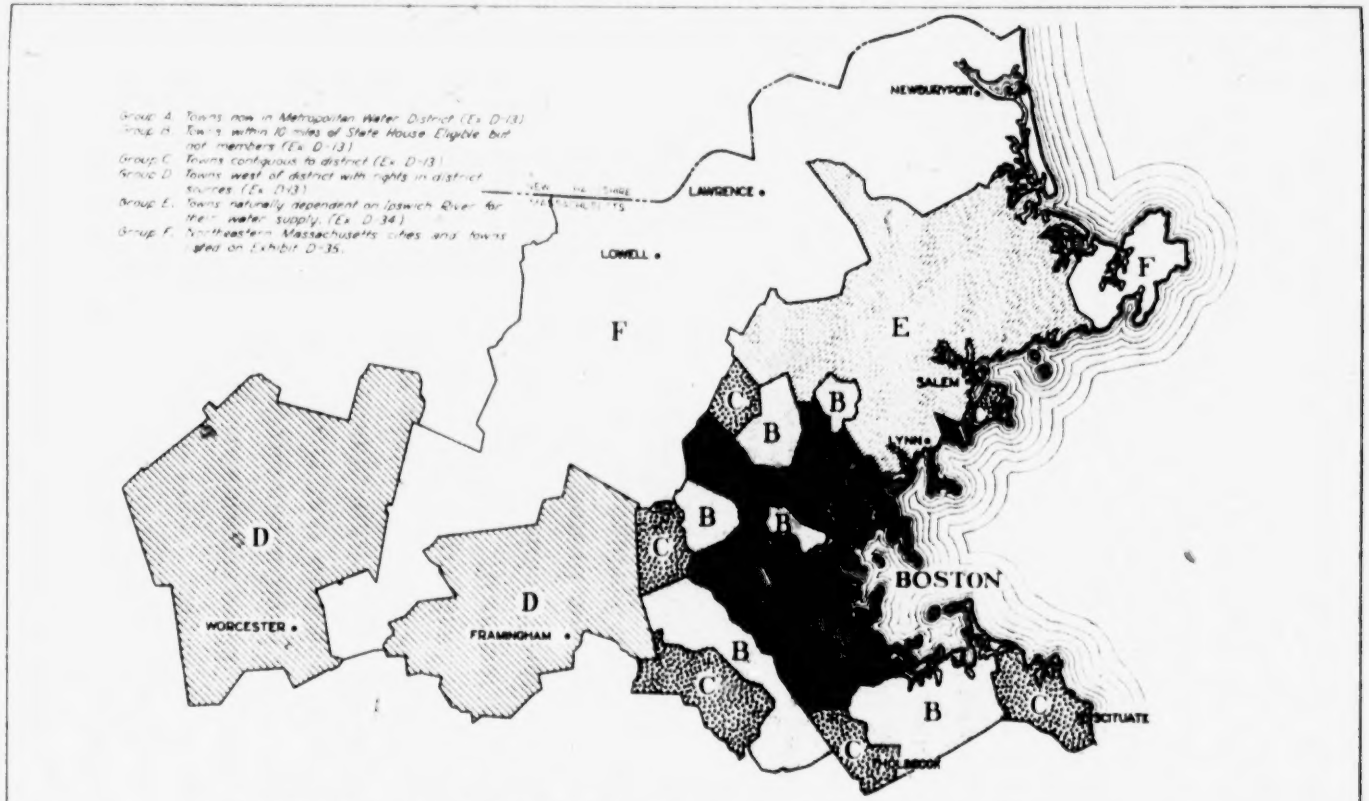
GENERAL FACTS.

The bill was filed by the State of Connecticut seeking to enjoin the Commonwealth of Massachusetts from diverting for Boston water supply a part of the waters of the Ware and Swift rivers. These streams are unnavigable tributaries of the Chicopee river, itself a non-navigable tributary of the Connecticut discharging into that river just above Springfield, and are situated wholly within Massachusetts.

The project is to take certain waters from the Ware river and from the Swift river and to establish eventually a large reservoir on the Swift. These waters are to be led through a conduit into the Wachusett reservoir, the present main source of water supply for Boston and neighboring towns and cities. A few miles below Springfield the Connecticut river enters Connecticut and flows in a southerly direction to Rhode Island sound. Long

The Connecticut rises in Canada and northern New Hampshire, flows southward between New Hampshire and Vermont and through Massachusetts. It is the largest river in New England, being about 345 miles long and draining an area of 11,300 square miles, of which 1,385 are within Connecticut.

Boston and the surrounding metropolitan area are faced with a serious water shortage in the near future and there is a real necessity for their making provision for a large quantity of additional water which will meet the needs of the region for a considerable number of years. The metropolitan area consists of 20 cities and towns, and 15 other cities and towns are eligible to become members; these 35 cities and towns have a population of about 1,900,000. Other cities and towns must be considered in intimate connection with the Metropolitan District, because first they are likely to depend on District water supplies at some future time, and secondly as will later



COMMONWEALTH OF MASSACHUSETTS ~ METR. DISTR. WATER SUPPLY COMMISSION

MAP SHOWING GROUPS OF NORTHEASTERN MASSACHUSETTS CITIES AND TOWNS REFERRED TO IN EXHIBITS D-13, D-33, D-34 AND D-35.

(BASED UPON MATERIAL FOUND ON EXHIBIT D-13aa)

APRIL 7, 1930

appear, if Ware and Swift waters be denied to Boston, all populations in the northeastern part of the state must divide up water supplies on a fair principle of equality of right. In this view the needs of the population of northeastern Massachusetts taken as a whole must be considered; insert opposite this page shows the territory. The total population thus concerned is now 2,860,000, estimated likely to reach a total in 40 years of 4,572,000. This whole region has a total present water supply of 343,000,000 gallons per day and a total consumption of 244,000,000 gallons per day, leaving a surplus of 99,000,000 per day. But use of water is increasing and population is increasing. Dry seasons have occurred when the Metropolitan District has been imminently close to water shortage. In 1970 owing to disuse of some of them the present supplies will probably have decreased from 343,000,000 to 289,000,000 gallons per day and the consumption requirements will probably have increased from 244,000,000 to 467,000,000 gallons per day, leaving a deficit of 178,000,000 gallons per day.

There is no serious dispute about the need of this region to provide presently for additional water.

Speaking in a general way this is the situation which led the Massachusetts legislature to provide for securing a water supply from the Ware and Swift rivers. It passed the act of 1926, c. 375, and that of 1927, c. 321, which are printed in defendant's reprint of answer p. 36-80. The plan of these laws was diversion into Wachusett reservoir (the principal present supply of Boston), of (a) flood waters of the Ware river (act of '26), and (b) certain waters of the Swift river (act of '27).

Because of possible effect of the proposed Ware and Swift works upon navigation of the Connecticut, Massachusetts applied to the Secretary of War under the act of Congress of March 3, 1899, ch. 425, sec. 10, for authority to divert Ware and

Swift waters as proposed. The Secretary of War after hearing both sides and examining the facts made a finding that the proposed diversion of the Ware river "will have no adverse effect on the navigable capacity of the Connecticut River" (reprint of answer p. 81-87). He also found that no impairment of the navigable capacity of the Connecticut would result from the diversion which his order permitted from the Swift river. The Secretary determined that no objection would be interposed by the War Department to these diversions. He permitted diversion of flood waters of the Ware in excess of 85,000,000 gallons per day between October 15 and June 15 and prohibited the taking of any water whatsoever except during that period. He permitted diversion of all waters of the Swift except enough to maintain a flow of 20,000,000 per day, but required during the period June 1 to November 30, both inclusive, release of 110 cubic feet per second (71,000,000 gallons a day) from the impounding dam on the Swift river whenever the flow of the Connecticut at Sunderland, Massachusetts (a town about 20 miles north of the confluence of the Chicopee and Connecticut), is 4650 cubic feet per second or less; and when the flow of the Connecticut river is more than 4650 and less than 4900 cubic feet per second 70 cubic feet per second (45,000,000 gallons a day) he required to be released. The Secretary found that discharge of 4900 cubic feet per second at Sunderland corresponds to an average gauge height at Hartford of 2.1 feet and a discharge of 4650 cubic feet per second at Sunderland means 2 feet gauge height at Hartford.

The annual flow of Connecticut river at the Massachusetts-Connecticut boundary is about 17,000 cubic feet per second (approximately 11,000 millions gallons a day); total watershed of Connecticut river 11,300 sq. miles, and watershed lying above Massachusetts-Connecticut boundary 9,915 sq. miles;

drainage area of Connecticut river watershed in Connecticut 1,385 sq. miles; drainage of Ware river at point of diversion 98 sq. miles; drainage of Swift river at point of diversion 186 sq. miles.

Diversions of the Ware and Swift as permitted by the Secretary of War will furnish about 191,000,000 gallons of water per day. The Massachusetts acts do not authorize diversion of any waters other than the Ware and Swift, and as to these the record shows that (as far as counsel can commit it) Massachusetts proposes to abide by the Secretary of War's requirements and restrictions touching the diversion.

The total drainage area of both the Ware and Swift subject to diversion is 2.93 per cent of the total watershed of Connecticut river above Connecticut. Diversion of water to the extent authorized by the Secretary of War represents an average yearly subtraction from the flow of the Connecticut at the state line of about 2 per cent; but 94 per cent of this diversion occurs when the Hartford gauge reads above $3\frac{1}{2}$ feet, which means $13\frac{1}{2}$ feet depth of water. Two feet on the Hartford gauge indicates 10 feet of water, which is the depth the government heretofore has sought to maintain below Hartford. But a War Department project contemplates a future 12-foot channel and nearly all the diversion proposed will be when there is more than that depth of water.

Many maps were introduced in evidence. Attached hereto will be found a map of convenient size sufficient for a clear understanding of most features of the case.

The complaint of Connecticut for an injunction against the proposed diversion is grounded on the allegation that any subtraction from the flow of the Connecticut through that state is a serious damage to the state and its people in that (a) it injures the navigability of the stream, (b) certain lands in the

Connecticut river bottom subject to yearly inundation will be injured by diminution of such inundation, (c) probability of a power development at King's Island, a few miles below the Massachusetts-Connecticut line, and the proposed diversion would diminish this power, (d) the run of shad is favored by high spring floods and the proposed diminution of these will seriously diminish this run, (e) the Connecticut river is a carrier of sewage from population and waste from factories, and diminution of the flow will decrease the capacity of the river to discharge and destroy this pollution. Much testimony was taken upon each of the foregoing topics.

In addition Connecticut alleges by an amendment to its bill that the Boston district can well be supplied with good water from the eastern part of Massachusetts and for this reason should be enjoined from subtracting in the least from flow of water into the Connecticut. A large amount of testimony was taken upon this subject.

PRELIMINARY QUESTIONS OF LAW.

Before taking up the specific grounds for relief above stated it will be convenient to consider a general contention which Connecticut pressed earnestly upon the argument. That contention is first that any invasion of the rights or privileges of a sovereign state calls for injunction regardless of damage, and even though not the slightest actual damage results; second that the Supreme Court in a suit between two states will apply the law of the states rather than any rule of its own; and that consequently, where both states have adopted the common law of riparian rights, the Supreme Court of the United States has nothing to do but to apply the strict rule of the common law in determining such a controversy as this.

Regarding the first branch of the contention it ignores that injunction is not granted where there is an adequate remedy at law; and also it seems to me directly in the teeth of the cases of *Missouri v. Illinois*, 200 U. S. 496, 521; *New York v. New Jersey*, 256 U. S. 296, 309; and *North Dakota v. Minnesota*, 263 U. S. 365, 374. In the latter case the court said:

> "In such action by one state against another, the burden on the complainant state of sustaining the allegations of its complaint is much greater than that imposed upon a complainant in an ordinary suit between private parties. 'Before this court can be moved to exercise its extraordinary power under the Constitution to control the conduct of one state at the suit of another, the threatened invasion of rights must be of serious magnitude and it must be established by clear and convincing evidence.' *New York v. New Jersey*, 256 U. S. 296, 309; *Missouri v. Illinois*, 200 U. S. 496, 521."

I think equally unsound is the contention that the Supreme Court in a suit between two states which recognize the common law is confined to rules sanctioned by common law. The case of *Kansas v. Colorado*, 206 U. S. 46, at p. 97, shows that the court in deciding suits between states follows primarily international law. The court there quoting Mr. Justice Gray declared that international law is a part of our law and must be administered when rights depending upon it are presented for determination. Chief Justice Fuller's language in 185 U. S. 146, is also quoted with approval:

> "Sitting, as it were, as an international, as well as a domestic tribunal, we apply federal law, state law, and international law, as the exigencies of the particular case may demand."

In *Kansas v. Colorado* one state had adopted the common law, and the other state applied the principle of priority of

appropriation in determining water rights. The cardinal rule between states claiming rights in interstate rivers is shown both by *Kansas v. Colorado* (p. 94-96) and *Wyoming v. Colorado*, 259 U. S. 419, 464-5, to be equality of right; that the effect on both states of what is done in one state must be considered so that both states may secure as far as possible equality of right in use of the water.

In the former case the court said p. 100:

> "Suppose the controversy was between two individuals, upper and lower riparian owners on a little stream with rocky bank and rocky bottom. The question properly might be limited to the single one of the diminution of the flow by the upper riparian proprietor. The lower riparian proprietor might insist that he was entitled to the full, undiminished and unpolluted flow of the water of the stream as it had been wont to run. It would not be a defense on the part of the upper riparian proprietor that by the use to which he had appropriated the water he had benefited the lower proprietor, or that the latter had received in any other respects an equivalent. The question would be one of legal right, narrowed to place, amount of flow and freedom from pollution."

The court held that quite a different rule applied to suits between states within its original jurisdiction; that the cardinal rule as between states is equality of right, saying that the question should be viewed not narrowly and solely as to the amount of flow in the Arkansas river, inquiring merely whether any portion thereof was appropriated by Colorado, but rather to determine how much Colorado might fairly appropriate under the rule of equality and the effect of such appropriation upon the lower state. The court awarded to the upper state the use of a very large share of the water. In reaching this conclusion the court adopted its own rule of international

law. In each international case as it arises I think the Supreme Court will adopt that rule of law which best works out equality and equity in the particular case. The result reached in *Kansas v. Colorado* it seems to me would not have been different whether Kansas recognized to a certain extent appropriation rights in water or not.

A similar comment seems to me sound on *Wyoming v. Colorado*. Whilst it is true that in that case the court took pains to show that each state recognized prior appropriation of water, I think essentially it enforced that rule because it is the only just rule applicable to an arid country where irrigation is the first essential. The inquiry into state law was pertinent because the Supreme Court does not impose upon a state any particular system of law.

The *Chicago Drainage case* seems to me an authority upon this point. The court there in the final decree allowed a diversion estimated to reduce the level of the Great Lakes about one inch, and this diversion was into another watershed and to a sea several thousand miles from the mouth of the St. Lawrence. Illinois and I apprehend Canada and most of the states tributary to the Great Lakes follow the common law, and I understand that common law doctrine was urged in that case as prohibiting diversion to another watershed.

It was put to counsel for Connecticut on the argument whether the quantity of water sought to be diverted might be taken out and used for domestic purposes in Massachusetts if the population using it were in the Ware and Swift watershed. Counsel said such use would be lawful because it would be riparian and contended that by the common law water could not be diverted for domestic use outside the watershed. The contention on behalf of Connecticut was distinct that not one drop of water could be taken from the Ware or Swift for use beyond the watershed.

In the first place it seems to be doubtful if there is any such absolute and rigid rule of the common law. I think cases may be put where that would not be the rule, for example where the diversion causes no damage as where there is enough water for all. But whether there be such a universal principle or not, certain it is that Massachusetts has a right to change her common law, and by the legislation in question, so far as her power extends, she legalized the proposed diversion. I think it cannot be maintained that Connecticut has any vested right to insist that Massachusetts must continue common law rules as originally introduced from England.

This was the ruling in the case of *United States v. Rio Grande Irrigation Co.*, 174 U. S. 690, p. 702, where the court said:

> "While this is undoubted, and the rule obtains in those States in the Union which have simply adopted the common law, it is also true that as to every stream within its dominion a State may change this common law rule and permit the appropriation of the flowing waters for such purposes as it deems wise. Whether this power to change the common law rule and permit any specific and separate appropriation of the waters of a stream belongs also to the legislature of a Territory, we do not deem it necessary for the purposes of this case to inquire. We concede *arguendo* that it does.
>
> Although this power of changing the common law rule as to streams within its dominion undoubtedly belongs to each State, yet two limitations must be recognized: First, that in the absence of specific authority from Congress a State cannot by its legislation destroy the right of the United States, as the owner of lands bordering on a stream, to the continued flow of its waters; so far at least as may be necessary for the beneficial uses of the government property. Second, that it is limited by the superior power of the General Government to secure the uninterrupted navigability of all navigable streams within the limits of the United States."

The case of *Kansas v. Colorado*, pp. 94-96, sustains the same rule that each state may decide for itself what law of riparian rights it will apply, and that federal authority will not enforce any particular rule upon any state; that while it is undoubtedly true that early settlers brought to this country the common law of England, it is for the states to pass their own laws and Congress does not impose upon the states any particular rule.

In *Wyoming v. Colorado*, 259 U. S. 419, one of the grounds urged by Wyoming was that Colorado could not rightfully take the water into another watershed. The court, following the controlling principle that the river throughout its course was to be looked at as a single stream wherein each state had an equal interest, rejected the contention that Colorado could not divert water into another watershed, but said the fact of diversion into another watershed had a bearing in another connection, which I take to mean in determining whether the diversion proposed is reasonable and consistent with equality of right.

In that case to secure equality of right the court permitted Colorado to divert for irrigation in another watershed. I see no reason why the same principle should not apply here, provided only the diversion of water is reasonable and no more than consistent with Connecticut's equality of right. If Massachusetts would have a right to abstract this much water under any system of law she might follow and for any use legal by that system, I cannot see that Connecticut has a better right merely because she and Massachusetts adopted the common law of England.

For the foregoing reasons I feel constrained to rule against any right of Connecticut to object to the diversion regardless

of damage to the Connecticut river. I think the principle to be applied is equality of right, and the particular inquiry is whether the proposed diversion will seriously and substantially cripple the flow of, or otherwise injure, the Connecticut river. If abstraction of the proposed quantity of water will not work a serious injury to Connecticut it seems to me immaterial whether that water be taken for use beyond the watershed or not. The mere question of right to take it beyond the watershed is one for Massachusetts, subject to the right of Connecticut to say that nothing can be done to Connecticut river waters within Massachusetts which will largely injure that river in Connecticut.

In other words I think the case upon this branch resolves itself into a question of fact as to the effect of the proposed diversion, and that this question of fact must be passed on with due regard to the established rule that the proof must show clearly and convincingly a very substantial damage in order to call for injunction.

I.

I now take up the particulars in which Connecticut claims substantial damage to the flow or quality of the Connecticut river.

NAVIGATION—AS TO THE LAW.

It is shown by the testimony offered by Connecticut and is found that a substantial commerce is carried on between Hartford and New York (and neighboring ports), both passenger business and freight business largely coal and oil. Regular lines of boats ply in this commerce between Hartford and New York and its neighborhood. The Connecticut river has long been treated by the United States as navigable from Hartford

to the sea. An annual expenditure for years has been made by the United States in preserving and bettering this navigation. The aim of the United States has been to maintain a minimum 10-foot channel. The difficulties to be overcome consist of a number of bars which form annually in the river between Hartford and the Sound. Annually these bars have been dredged by the United States, this work being designed to maintain substantially a minimum 10-foot channel.

From Hartford up river as far as Holyoke small boats ply and carry a small business. There is a possibility of a large dam for power at a point a few miles south of the Connecticut line near the Windsor locks, and this dam, if built, would improve navigability between Hartford and Holyoke.

The Secretary of War as before stated made orders modifying and reducing the diversion of Ware and Swift water which would have been possible under the Massachusetts legislation. He finds that the diversion specified by him would not injure appreciably Connecticut navigation. But in view of this controversy then pending the Secretary said he issued no affirmative formal permit, simply determining that the United States would interpose no objection to the diversion. He required a discharge from the Swift river reservoir during the critical period of low water, which would increase instead of diminish the flow of water in the Connecticut, and to that extent better navigation.

In other words the Secretary consented on behalf of the United States to both the Ware and Swift diversion specified by him, but his order instead of being an affirmative license was of a negative character to the effect that the United States did not object. It seems to me his finding that the permitted diversion would not injure appreciably Connecticut navigation is conclusive if the action is within his authority. If Congress it-

self should fix the stage of water in the Connecticut adequate for navigation it would be conclusive and no state would be heard to contend in favor of a deeper, or shallower, or a different channel. *Pennsylvania v. Wheeling Bridge Co.*, 18 How. 421, 430; *South Carolina v. Georgia*, 93 U. S. 4, 11-12; *Miller v. Mayor*, 109 U. S. 385, 393-395; *Monogahela Bridge Co. v. United States*, 216 U. S. 177, 195; *Philadelphia Co. v. Stimson*, 223 U. S. 605, 635; *United States v. Chandler-Dunbar Co.*, 229 U. S. 53, 63-65; *Southern Pacific Co. v. Olympian Dredging Co.*, 260 U. S. 205, 208-210.

In *Monogahela Bridge Co. v. United States*, 216 U. S. at p. 195 the court said:

> "It was not for the jury to weigh the evidence and determine according to *their* judgment, as to what the necessities of navigation required, or whether the bridge was an unreasonable obstruction. The jury might have differed from the Secretary. That was immaterial; for Congress intended by its legislation to give the same force and effect to the decision of the Secretary of War that would have been accorded to direct action by it on the subject. It is for Congress, under the Constitution, to regulate the right of navigation by all appropriate means, to declare what is necessary to be done in order to free navigation from obstruction, and to prescribe the way in which the question of obstruction shall be determined. Its action in the premises cannot be revised or ignored by the courts or by juries, except that when it provides for an investigation of the facts, upon notice and after hearing, before final action is taken, the courts can see to it that executive officers conform their action to the mode prescribed by Congress."

In *United States v. Chandler-Dunbar Co.*, on p. 64 the court said:

> "So unfettered is this control of Congress over the navigable streams of the country that its judgment as to

whether a construction in or over such a river is or is not an obstacle and a hindrance to navigation, is conclusive. Such judgment and determination is the exercise of legislative power in respect of a subject wholly within its control."

The field of regulating navigation was left open to the states for many years by failure of Congress to act. See *Willson v. Black Bird Creek Marsh Co.*, 2 Pet. 245; *Escanaba v. Chicago*, 107 U. S. p. 678. But by the act of 1899 Congress seems very completely to have taken jurisdiction of everything pertaining to navigation. The rule is too well settled to admit of argument that whenever Congress enters a field originally common to federal and state law it thereby excludes state action within that field. *Sherlock v. Alling*, 93 U. S. 99; *Chicago, R. I. & P. R. Co. v. Hardwick Farmers Elevator Co.*, 226 U. S. 426; *Missouri P. R. Co. v. Stroud*, 267 U. S. 404.

It was suggested on behalf of Connecticut that the Secretary could not lawfully consent to diversion of water for domestic use, any more than he could for carrying off Chicago sewage, see *Wisconsin v. Illinois*, 278 U. S. 367, p. 400, and *Sanitary District v. United States*, 266 U. S. 405, pp. 429-430. The secretaries who granted the permits for diversion at Chicago never found that the diversion would not affect navigation. On the contrary it seems plain that both Secretaries recognized that the diversion would damage navigation (266 U. S. p. 430). The permits in that case were made temporary in view of the pending litigation and left undetermined to be decided in the litigation the effect of the diversion upon the height of water in the lakes. The court and master found that navigation was seriously injured by the diversion. What the court then held was that the Secretary had no right under Sec. 10 act of 1899 to divert water needed for navigation, merely to carry off

Chicago's sewage. Here on the contrary the Secretary after hearing of both sides has found that the diversion will not injure navigation; indeed he requires a discharge which will improve navigation at stages of lowest water; and concludes that the United States will interpose no objection.

The case of *Wisconsin v. Illinois* (see *Maine Water Co. v. Knickerbocker Steam Towage Co.*, 99 Me. 473, therein approved) determines that the phrase "affirmatively authorized by Congress", in Sec. 10, means authorized through the authority in that section delegated to the Secretary of War. And this was the practical interpretation of the statute by other governmental departments referred to by Chief Justice Taft.

I think it cannot be maintained that every structure in order to come within Sec. 10 must be one purely for the purpose of aiding navigation. The language of the section negatives this. It authorizes the Secretary to consent to any "obstruction" described. It mentions any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structure, etc., outside established harbor lines or where no harbor lines have been established, and it includes as it seems to me dams and other obstructions and diversions in tributaries of navigable waters which may affect navigability. It seems to me the Secretary under Sec. 10 may authorize a dam on a tributary upon finding that it would not injure navigation. He might license such dams for power, boating, propagating fish, etc., etc. The act prohibits *unreasonable* obstruction to navigation (278 U. S. 413) and the Secretary is authorized to determine for Congress what obstructions are unreasonable. Works on unnavigable tributaries of navigable waters are subject to the paramount rights of the United States over navigation, and the Secretary has jurisdiction over such structures. *United States v. Rio Grande Irrigation Co.*, 174 U. S. 690, pp. 707-709.

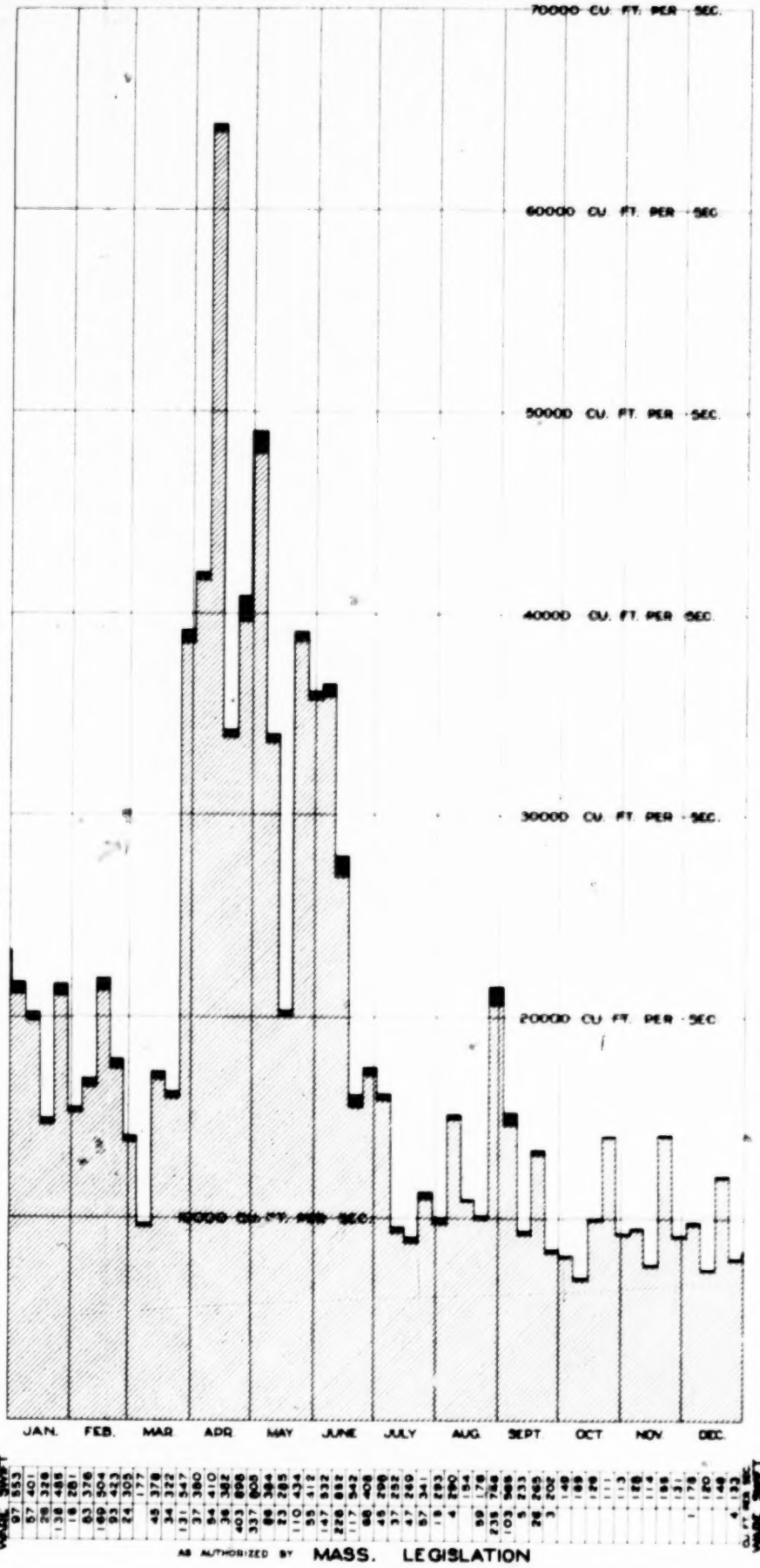
I think the test of validity to be applied to an authorization by the Secretary is whether the matter involved is germane to navigation, whether it has relation to that subject. Even Congress has no right to destroy navigable capacity and the principle which applies to the Secretary is the same which applies to Congress, viz: that his act must have relation to the control of navigation. This was the test stated by the court in *Wisconsin v. Illinois*, 278 U. S., p. 415. I do not think it can be maintained that every work referred to in Sec. 10 must be one whose sole design is to aid navigation. The Secretary is given jurisdiction over the whole range of structures and works [except those named in Sec. 9], from those designed solely to improve navigation to those like dams, booms, weirs, etc., etc., not designed to better navigation and which may or may not injure it. A large part of the function of the Secretary is to determine whether the structures last referred to injure navigation materially and to license them or not according to his determination. It seems to me that the determinations of the Secretary within this range are authorized by Sec. 10 and so authorized by Congress.

Moreover it is to be noted that the works authorized are to a certain extent in direct aid of navigation. The testimony shows that the critical period of navigation is during extreme low water and the Secretary's permit is on condition that water be added to the stream during that period. The proof shows that from 1913 to 1929 inclusive the Swift river reservoir, operated as required by the Secretary, would have increased the flow of the Connecticut 43.5 days during each year on the average, the number of days varying from 110 in 1913 to zero in 1922 and 1928, the last two being years of unusually high water.

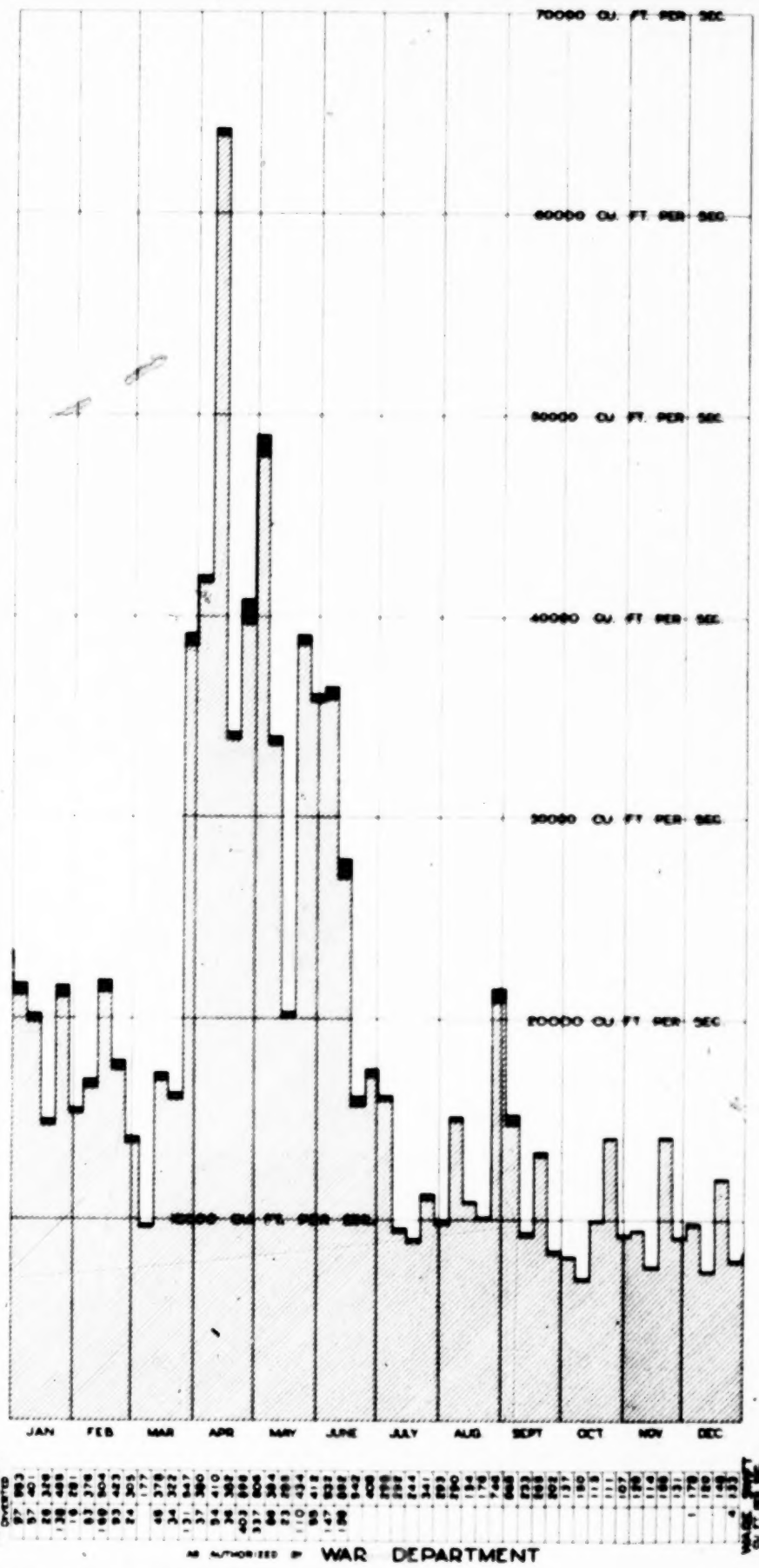
NAVIGATION—FINDINGS AS TO.

On the possibility however of the Secretary's permit being held inconclusive I will consider the testimony on navigability contained in the record. This consideration does not need to be lengthy. The substance of the testimony as to the commerce carried on has been indicated. The United States has aimed to maintain a channel of 10 feet over the numerous bars below Hartford. These have to be dredged out every year and the witnesses, who are shippers and masters of vessels in the trade, are in entire agreement in their story of difficulties at the lowest stages of water, when the depth on the bars at times falls even below 10 feet. This depth is considerably influenced also by the winds and tides as well as by the stage of water. There is no proof of difficulty in navigation at times when the stage of water is 12 feet or even 11 feet, 11 corresponding to an indication on the Hartford gauge of 3 feet. The discharge required from the Swift river reservoir during low water periods will somewhat benefit navigation. I cannot see how the diversion can injure navigation and therefore find that the proposed diversions will not interfere perceptibly or materially with the navigation of the Connecticut.

The proposed subtractions and additions to Connecticut river flow are shown in a large graph covering by weeks the whole period from 1913 to 1929 inclusive, defendant's exhibit 4. It was accepted as substantially correct by both parties and by all the witnesses. Each of the columns on the graph indicates a weekly flow of the Connecticut at the Massachusetts-Connecticut state line, that is an average flow expressed in cubic feet per second during the week shown at the foot of the chart. A solid white section at the head of a column scales the amount of water that would have been diverted during that



AS AUTHORIZED BY MASS. LEGISLATION



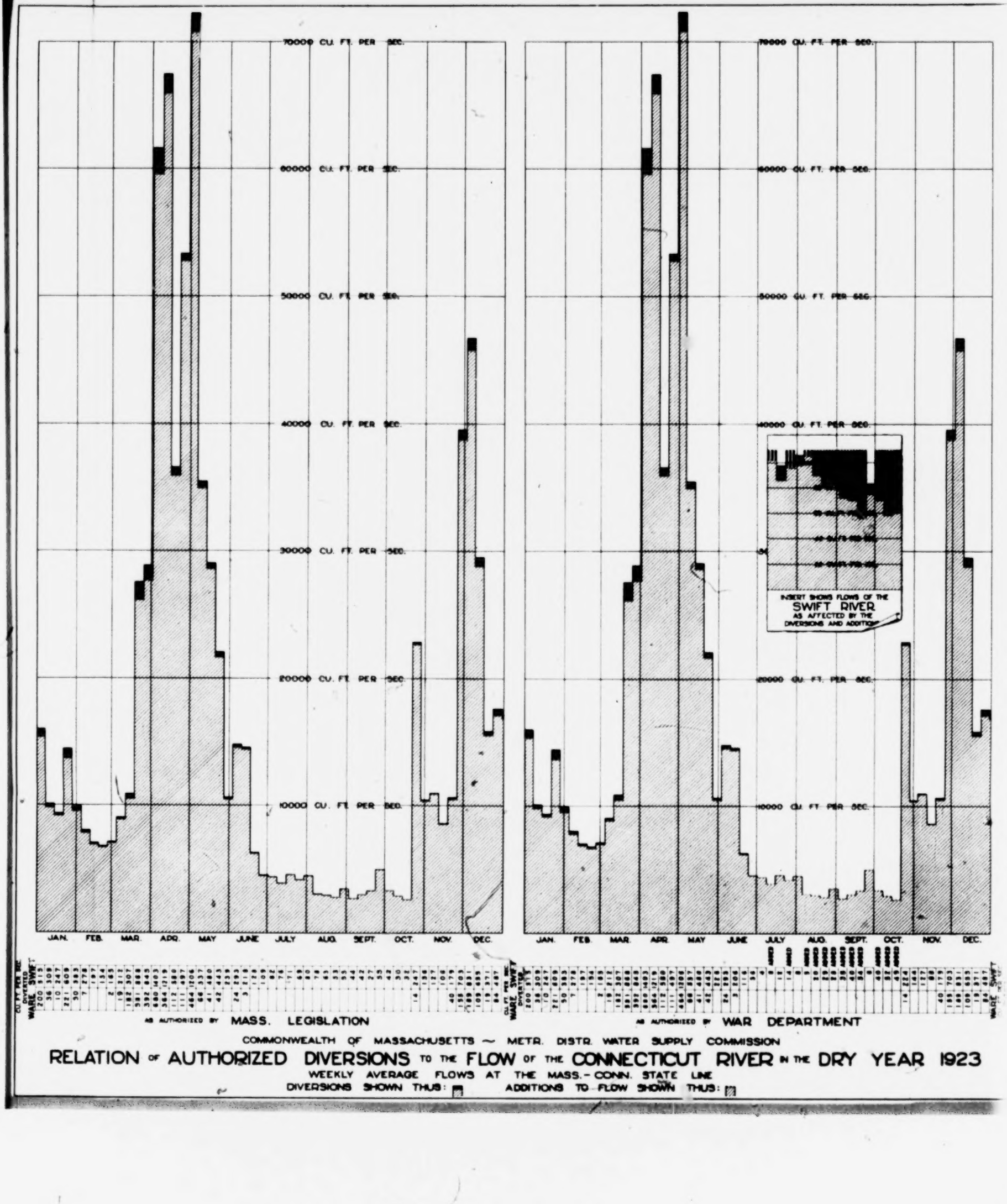
AS AUTHORIZED BY WAR DEPARTMENT

COMMONWEALTH OF MASSACHUSETTS ~ METR. DISTR. WATER SUPPLY COMMISSION

RELATION OF AUTHORIZED DIVERSIONS TO THE FLOW OF THE CONNECTICUT RIVER IN THE WET YEAR 1928

WEEKLY AVERAGE FLOWS AT THE MASS. - CONN. STATE LINE

DIVERSIONS SHOWN THUS: [ ] ADDITIONS TO FLOW SHOWN THUS: [ ] (NONE IN THIS WET YEAR)



COMMONWEALTH OF MASSACHUSETTS ~ METR. DISTR. WATER SUPPLY COMMISSION

RELATION OF AUTHORIZED DIVERSIONS TO THE FLOW OF THE CONNECTICUT RIVER IN THE DRY YEAR 1923

WEEKLY AVERAGE FLOWS AT THE MASS. - CONN. STATE LINE

DIVERSIONS SHOWN THUS: ▤ ADDITIONS TO FLOW SHOWN THUS: ▨

week from the Ware and Swift rivers under the Secretary of War's regulations. A solid line at the head of a column shows very slight diversion, too small to be indicated on a chart of this scale, while a dotted line at the head of a column means additions to a normal flow by release of water impounded in the Swift reservoir. To illustrate the showing of this graph I insert opposite this page a section of the graph for the dry year 1923 and one for the wet year 1928. The average proposed diversion of water per annum is agreed to be substantially two per cent of the flow of the Connecticut at the state line. The maximum diversions are at high water and amount to from 5 to 6 inches, that is at periods of very high water the stage of the Connecticut may be reduced 5 to 6 inches, at medium stages less, and at very low stages its flow is increased.

INUNDATED LAND.

The parties stipulated that in the Connecticut river bottoms there are about 9,500 acres of meadow land used for growing hay which are subject to periodical inundation by the river; that this acreage grows from two to three tons of hay per year which is used for feed of cows and horses and usually can be marketed, if carried over to spring, at about $26 per ton, or sold standing at substantially an average price of $12.50 per ton; that when this land is inundated it grows a hay crop without fertilization and the flood waters are a benefit in that they increase the crop of hay which can be grown without fertilization; that diminution in the height of flood water would be a detriment to such of the lands as thereby are not overflowed and that practically no crops other than hay are grown on the regularly inundated land.

It needs no testimony to prove that floods and inundations frequently cause damage. The Mayor of Hartford in this case

showed dykes built at considerable expense in Hartford to fend off Connecticut river floods. The benefit from inundation of the 9,500 acres of hay land is exceptional. The amount of injury to the hay crop likely to result from the Swift and Ware diversion was not proven,—probably is not capable of proof—and was left to conjecture. How much hay land would fail to be submerged because of the diversion is quite uncertain. The land owners who testified showed that the hay lands were not of uniform elevation; that sometimes small areas are not submerged resulting in a diminished crop.

The height of floods will be lessened from one to six inches by the proposed diversion. It seems certain that small pieces of hay land here and there in some years would fail, because of the diversion, to receive flood waters, which they would have gotten without it. But there is no attempt to show to what extent this would be true and it is impossible to determine from the evidence.

The lessening of spring floods will have its advantages and disadvantages. It will lessen some damages and increase others. On the whole I think the damage to the hay land is not shown to be of "serious magnitude;" and that such damage, far from being "established by clear and convincing evidence", is shown by no evidence making it possible of computation or proving that it is large.

POWER PROJECT.

Only one possible power development is shown. This is at King's Island in Connecticut near the state line where 4,000 horse-power is now developed at a 24-foot head. The company which owns this power has been authorized by the Federal Power Commission to build a higher dam to develop approximately 50,000 horse-power. This work so far as the testimony

shows has not been resolved on by the company, and so far as shown the required capital has not been subscribed or arranged for.

If these facts bring the power within the cases of *New York v. Illinois and Sanitary District of Chicago*, 274 U. S. 488, and *New Jersey v. Sargent*, 268 U. S. 328, pp. 338-9, injunction on this ground should be denied because no present use of the waters for power purposes will be disturbed.

But assuming that the cases cited do not apply; giving allowance for water released at times of low flow in accordance with the Secretary of War's requirements, the loss of power attributable to the diversion would amount to $7,920 per year valuing each kilowatt hour lost at 6 cents; $7,920 per year capitalized at 5 per cent is about $160,000; from this should be deducted $80,000 representing a saving in capital investment resulting from the required addition to water in low flow furnishing 1,000 additional horse-power at low stages; this increase of minimum power would cause a corresponding decrease in steam-power plant, which will be required to supplement the water in times of low flow. This $80,000 deduction was testified to by Mr. Weston Fuller whose testimony was not questioned.

Therefore it appears that if this water-power is developed to the extent of 50,000 horse-power the Massachusetts diversion of Ware and Swift waters will cause an injury to the power of $80,000.

I know of no objection (assuming that the immaturity of the power project is not fatal) to the court requiring Massachusetts to pay to the power company or its assigns $80,000 if and when the power is developed to the extent stated.

RUN OF SHAD.

It is shown that shad have been accustomed to run up the Connecticut river and its lower tributaries to spawn. This happens in the spring, generally in strong flowing water. The fresh water from the Connecticut in time of flood is described as going out two miles into Long Island Sound and attracting the shad. Connecticut is engaged in operating fish hatcheries for propagating shad and it licenses and regulates shad fishermen.

Some witnesses believed that a large freshet encouraged shad to come up the river. The Superintendent of Connecticut State Board of Fisheries and Game believed that a reduction in flood would be harmful to fish life, but as to whether the shad catch varied directly with height of floods the witness was not willing to commit himself. A graph showing statistics for the shad catch was introduced, complainant's exhibit 29. See also complainant's exhibit 30. The graph I think fails to prove that shad catches follow high May floods. This is also indicated by complainant's exhibit 29a, which was prepared by Massachusetts from the shad catch figures in complainant's exhibit 30 combined with the flood flows as found in the records of the United States Geological Survey and of the Holyoke Water Power Company. These charts lead to the inference that the variation in shad catch is due largely to elements other than mere height of floods. Such factors as temperature, time of flood, artificial propagation of shad, limiting and regulating shad fishermen and the fishing industry, existence of dams and other conditions. See also defendant's exhibit 12 showing shad taken each year from 1872 to 1929.

On the evidence I find that the lowering of flood water resulting from proposed diversions is not shown to be materially injurious to the shad run.

It was also contended that pollution in the Connecticut would be increased by the proposed diversions and that this would have a deleterious influence on fish life. For the present I pass the question of pollution to take it up under the next heading.

POLLUTION OF THE CONNECTICUT.

The testimony shows that the Connecticut river has been treated, like most of our rivers, with an utter disregard to its purity. Pollution both from sewage and factory wastes has been permitted both by Massachusetts and by Connecticut and the policy in those states appears to have been not materially different from the other states in New England. This is not a bill to abate the pollution. The issue is not raised in the case and Connecticut in such a bill could not come into court with clean hands. See *Missouri v. Illinois*, 200 U. S. 496, 518-520.

The bill of Connecticut sets forth that certain cities, towns, factories and riparian owners in Massachusetts discharge sewage and factory waste into the river. The contention is that such a condition necessitates the whole natural flow of the stream, including flood flow, in order to fight this pollution. Any diminution of this flow Connecticut says will seriously affect the public health, cause sickness, suffering and possible disease and irreparable damage.

On this subject as well as on the water and water supplies in northeastern Massachusetts yet to be considered some of the most eminent and fair-minded experts of the country gave testimony. I wish to testify to the qualifications, high intelligence and absolute fairness of these experts.

Their testimony was based on a great number of samples taken from Connecticut water during extended periods of time. The water is shown to be polluted. The number of colon

bacilli which it contains was the subject of much testimony which I do not think needs elaboration. Deposit of sludge beds at some places was also shown. It was agreed by all the experts that water in the polluted condition of the Connecticut is short of a full oxygen supply and the quality of the water to a large extent is indicated by its deficiency in oxygen. Oxygen operates to consume the pollution and doubtless flood waters operate to some extent to carry it out to sea. It was shown that the Connecticut river between the northern Connecticut line and a point about six miles below Hartford is greatly improved in condition notwithstanding the discharge of sewage by Hartford. The reason of this is that the water increases from the air its oxygen supply and oxygen is destructive of pollution. Two of the principal Connecticut experts on this subject were Professor Winslow of Yale and Dr. Rudolfs of Rutgers. The following is an extract from Professor Winslow's testimony:

DIRECT EXAMINATION

"Q. Now, you are acquainted in a general way with the Massachusetts legislation as to the abstraction of water authorized under that legislation of Massachusetts? A. In a general way, yes, sir."

"Q. You are acquainted with the restrictions imposed by the War Department? A. Yes, sir."

"Q. How much effect would the restrictions imposed by the War Department have upon the Connecticut River at the State line, assuming they are complied with? A. I don't think that the change would be sufficient one way or the other during the summer months to be detected by any methods at our disposal, either way.

"Q. It doesn't make any difference whether it is the Massachusetts legislation or the restrictions of the War Department? A. Just look at it from a broad—let me try to look at it not as an expert, but from a broad com-

mon sense standpoint at the beginning. Say you are putting in or taking out something well under five per cent. Now, then, none of these methods we are using on the river would check on samples taken half an hour apart within five per cent. In other words, I cannot conceive that the effect of these differences and the change in the condition at the State line could be detected by any means we now pursue.

"Q. What do you mean?

"The Witness: I mean if you take out five per cent of the water in the Connecticut River or five per cent of the oxygen, or if you put it in, put in five per cent more or take it out of that now reaching the State line, if you could take the river just above the State line and had a magnet and could pick out five per cent of the oxygen or put in five per cent more of oxygen, nobody would be able to tell the difference. If the experts on both sides of this case were there before and afterwards I doubt if they would be able to obtain results that would show a difference.

"If you take out ten per cent, I am inclined to think you could probably find a damage or a benefit, depending on whether you are putting it in or taking it out. Then if you get 20 per cent, I am rather sure you would have a rather definite and appreciable and serious result if you diverted out of this flow. (This flow is around 3,400 million gallons average during that summer.) Now if you had taken out 500 million gallons out of that thirty-four, out of that pure water, I think there would have been a very serious effect on the water at the State line and it would probably have had a greater effect on the oxygen, and would have probably been sufficient to push that river over the danger line and make it an open sewer instead of a stream. But if you took out four hundred, you could probably detect it analytically; it might be a little less pure. If you took out a hundred thousand or two I don't think that even a group of eminent experts could detect with any certainty any effect. We can say that every quart we take out makes it worse or every quart we put in

makes it better, but within the limits we can use in analyzing you would have to have 10 per cent change, let us say, one way or the other before you could get anything that would be really significant.

"Q. So that so far as the actual condition of the water is concerned it isn't going to be materially affected one way or the other? A. I don't think so.

"Q. It can't be any better and you don't think it would be any worse? A. I don't think either diversion under the War Department ruling or diversion under the Massachusetts statute, as I understand it, would make any detectable difference in the water at the State line.

"Q. At present? A. At present.

"Q. Now you say that if there was a contribution during the low flow period of perhaps 10 per cent of oxygen from pure water it would have an appreciable effect for the good of the stream at the State line? A. I think it would. I think you would probably find that that was a detectable difference.

"Q. So that if the compensation from the diversion of the Ware and Swift rivers amounted to 10 per cent of your oxygen in spite of the amount which is authorized to be released under the War Department's restriction, you would have a substantial benefit instead of a situation which does not change the present situation? A. I think anything that added 10 per cent to the pure water in the Connecticut river would benefit it appreciably."

CROSS EXAMINATION.

"Q. Supposing that the flow of the Swift river during that period was 1.3 per cent of the Connecticut's flow at the state line, would that amount fall within the quantities which you described as negligible and non-detectable? A. I think it would, yes, sir.

"Q. And as I understood you, neither you nor the experts on our side would be able to determine with any satisfaction to themselves or to yourself, what the effect of

that was, that addition or subtraction? A. Assuming it to be 1.3 per cent of the total flow of the river?

"Q. Of the total flow of the river? A. Yes; I think that is true.

"Q. As I understood you, that would be true probably up to a contribution or a diversion of about five per cent? A. I should say somewhere around there, yes.

"Q. And after five per cent it would become detectable and at 10 per cent I think you stated that it would be detectable? A. Yes.

"Q. And at 20 per cent it would be not only detectable but serious? A. Yes, sir.

"Q. And that applies with reference to the amount of oxygen in the water? A. Yes, that applies to water which is relatively pure. I am assuming in that, that the water diverted is water diverted at the upper part of the stream before it is heavily polluted. If you take out one-fifth of the water at the state line you would not change the percentage relations at all.

"Q. Would you say that that same conclusion was true as regards the public health? A. Well, yes, I should, because you would have to have an enormous change in quality on the one hand and an enormous improvement, to make the river safe for bathing. You would have to have a very large change for the worse to make it impossible to purify it by storage, chlorination, or filtration. I should say then that a change of five per cent either way was not of practical moment.

"Q. Either as regards the purity of the water or the effect on the water with respect to public health? A. Yes, sir. • • •

"Q. If there would be any determinable difference how much difference do you think there would be in the cost of purifying the Connecticut river at Hartford, in the way you have suggested by storage, filtration, and chlorination, before and after this Ware and Swift river diversion? A. I have tried to indicate that the difference due to the abstraction of one per cent or two per cent of water is so

slight that it cannot be measured in any concrete way. It is a purely theoretical damage or advantage when we are within these limits.

"Q. For any purpose? A. For any purpose that I know of we cannot determine within one or two per cent * * *"

Doctor Rudolfs' testimony did not differ very materially from that given by Professor Winslow. He agreed that quite a substantial addition or diminution of the Connecticut flow would be necessary to make a noticeable difference in pollution. Professor Earle B. Phelps of Columbia, Mr. Robert Spurr Weston and Mr. George W. Fuller, all called by Massachusetts, examined over 4,000 samples of Connecticut water and tributary waters taken at 15 different stations during a period of about six months. They all testified that the diminution in flow resulting from the proposed diversions would have no perceptible effect on pollution.

I think the plaintiff has failed to prove that the proposed diversion would perceptibly increase Connecticut river pollution, and consequently that there is no satisfactory proof of material pollution damage to the Connecticut to result from installing and operating the proposed Ware and Swift works.

II.

The next inquiry is whether Boston ought to be compelled on the evidence to take its water from the eastern portion of the state. Thus far the findings and statement of evidence have been confined to effect on the Connecticut river of the water diversions proposed by Massachusetts. On that branch of the case my conclusion is that Connecticut has failed to show any important and very considerable damage (unless it be to the power plant which can be paid for in a

definite sum of money). But I think it must be admitted as witnesses testified that any diminution of the flow of the Connecticut causes damage to some extent; some damage although it may be small and incapable of estimation. And were it made clearly to appear that Boston and the other population in northeastern Massachusetts have an abundance of perfectly good water at home, that might be a good reason why equity should enjoin their going to the Connecticut watershed and thereby causing a neighboring state even a small damage.

In this view I have regarded as important the allegation of Connecticut in an amendment to the bill that the Boston District as well as the neighboring population can well be supplied with good water from the eastern part of the state. Many civil engineers, water engineers, and water and sewage experts were examined upon this question and many exhibits were introduced.

The first fact, and I think it quite important, is that the people of Massachusetts have decided against the eastern water supplies by passing the Ware and Swift legislation. These acts were the result of long-continued and careful study commencing in 1895. In that year there was a report, House Document (1895) No. 500, by the Massachusetts State Board of Health. As a result of this report the present Wachusett reservoir, in which are stored the waters of the upper Nashua river was adopted. A second report was made in 1922, House Document No. 1550, a Report of Joint Board of Water Supply Needs and Resources. This report embodied the recommendations of the Massachusetts State Department of Health and the Metropolitan District Commission, acting jointly, as to the appropriate method of extending the Boston Metropolitan District water supply. The report recommended extending a tunnel westwardly from the Wachusett reservoir to the Ware, thence further west to the Swift where a reservoir was to be

built in which to store waters drawn from these streams. This report was not acted upon by the legislature at once and another commission known as the Gow-Hazen Commission examined the situation and reported in favor of taking water from the Ware river together with certain eastern Massachusetts sources (including the Assabet, Ipswich, and Sudbury rivers). This report raised objections from the Ipswich valley, from Concord, and from towns on the Assabet. Finally the legislature definitely rejected the eastern supplies including the Merrimack and passed the acts of 1926 and 1927 for taking water from the Ware and Swift. I think these investigations and the legislative acts show a public sentiment against the eastern water supplies and make a *prima facie* case that these supplies are inadvisable, either because inadequate or unfit. However the engineers and other experts called by Connecticut have made a strong effort to show that this legislative determination is wrong and that the northeastern portion of Massachusetts has abundant supplies of water of good quality for Boston and the northeastern population of the state for the next 50 years and more. The southeastern part of Massachusetts, including Cape Cod, seem to have sufficient supplies of water for itself and was not brought into the case.

Mr. Jacobs a civil engineer, of Morris Knowles & Company of Pittsburgh, submitted plans for supplying Boston and northeastern Massachusetts for at least 50 years with water from the Atlantic watershed in Massachusetts.

The serious question is whether the water supplies are there and whether they are of good quality. There is no material dispute as to the present and future requirements of water. Professor Winslow offered a suggestion that the future growth of population was over-estimated. He may be entirely right in general, but he apparently was not speaking of northeastern Massachusetts apart from other portions of the state. It seems

to me we cannot ignore that such a territory within convenient motor car distance from Boston is likely to increase much more in population than the state at large.

Defendant's exhibit 32 is designed to show that by 1970 northeastern Massachusetts, including Boston and vicinity, will have a deficit of 178,000,000 gallons a day, and that its demand for water will then be 467,000,000 gallons a day. This exhibit shows populations, supplies and consumption requirements for the years 1929, 1970 and 2000, for the whole northeastern portion of Massachusetts. There is no large controversy as to the water requirements, except that the growth of population for a long term is quite uncertain. In considering the case I have ignored the population estimates for the year 2000 but find that the estimates for 1970 seem within the reasonable probabilities. The following table is made up from the exhibit.

	1929	1970
Total population	2,860,000	4,572,000
Total million gallons a day water supply resources:		
District (not counting Ware and Swift)	147	134
Local sources (of District Group)	61	38
Local sources (of outside groups except from the Ipswich)	50	32
Ipswich river	70	70
Assabet river (emergency supply)	15	15
	343	289
Total consumption requirements:		
District	197	373
Outside the District	47	94
	244	467
Surplus*	99	
Deficit		178

*Distributed over a number of independent communities with no connections making their surpluses mutually available.

The testimony on behalf of Connecticut before referred to urged that the following sources are available in eastern Massachusetts in addition to those named in defendant's exhibit 32:

	Million gallons a day
Shawsheen river	30
Lower Sudbury river	17
South Sudbury (in addition to that now used by Massachusetts)	27
Assabet river (in addition to the 15 million gallons a day admittedly available as an emergency supply)	20
Total	94

The sources last named totaling 94,000,000 gallons a day will be insufficient to meet the 1970 probable deficit. Besides this Massachusetts urges objections to the plan.

Witnesses on behalf of Connecticut put forward the Merrimack river which they urged is a practically inexhaustible supply to be used, either in lieu of the 94,000,000 gallons a day plan, or to make good any deficit should that plan be adopted.

The first plan mentioned involves a number of minor sources (Shawsheen, Lower Sudbury, South Sudbury, and Assabet rivers). The Merrimack river plan involves a diversion of 200,000,000 gallons a day from the Merrimack river at Tyng's Island, which is in Massachusetts about three miles below the New Hampshire line.

15 WATERSHED PLAN.

The first plan (see complainant's exhibit 32) involves combining water from 15 watersheds, 9 of them being small watersheds on the Assabet river. The Assabet sources contain a

total drainage area of 58.8 miles and the plan involves carrying the water to the Wachusett aqueduct partly by gravity and partly by pumping. The watersheds (indicating them by the capital letters shown on the exhibit) show as follows:

Watershed	Drainage area	Size of reservoir	Elevation
A	11.3 sq. mi.	212 million gallons water to be pumped into Reservoir B-1	230
B-1	5.3 sq. mi.	848 million gallons water pumped to Wachusett Aqueduct	330
B-2	4.3 sq. mi.	716 million gallons water flows into Wachusett Aqueduct	330
C	15.1 sq. mi.	38 million gallons water pumped into Wachusett Aqueduct	230
D	1.6 sq. mi.	65 million gallons water to flow into Wachusett Aqueduct by gravity	325
E	4. sq. mi.	48 million gallons water to flow into Wachusett Reservoir by gravity	300
G	6.5 sq. mi.	193 million gallons water to be pumped into Reservoir E	300
H	7.7 sq. mi.	264 million gallons water to be pumped into Reservoir I	320
I	3. sq. mi.	180 million gallons water flows by gravity into the aqueduct	280

The South Sudbury supply involved in this plan being for the most part polluted would have to be filtered or otherwise treated before use. Mr. Jacobs estimated a supply from this source of 15,000,000 gallons a day, which Massachusetts says is only 11,000,000 a day.

Mr. Jacobs' plan involves taking water from the Lower Sudbury to Hobbs Brook reservoir (at present used by the city of Cambridge for its water supply). The proposal is to increase the size of the Hobbs Brook reservoir from its present capacity of 2,000,000,000 gallons to 8,265,000,000 gallons. By this means the Hobbs Brook supply would be increased about 27,000,000 gallons a day, the water coming from the Sudbury river below Framingham reservoir No. 1 and below lake Cochituate.

Water from the Shawsheen river which rises in Lexington and flows in a general northeasterly direction joining the Merrimack below the city of Lawrence is to be gathered in two reservoirs (Upper Shawsheen res. and Lower Shawsheen res. on the exhibit). From these reservoirs the Shawsheen water is to be pumped into a large reservoir on the upper waters of the Ipswich. The Ipswich flows in a northeasterly direction to the ocean near the village of Ipswich. Mr. Jacobs testified that a yield of something over 100,000,000 gallons a day could be obtained by this combination of Shawsheen and Ipswich waters. It is admitted that to preserve the quality of the water in both streams below the diversion, 10,000,000 gallons a day must be released on the Ipswich river and 3,000,000 a day on the Shawsheen. The plan involves filtration of the water at the Ipswich dam, from which it would be pumped to Spot pond, one of the present distributing reservoirs for the city of Boston. Because of the natural claims of towns in Essex county to the use of Ipswich river water Mr. Jacobs computed only 78,000,000 gallons a day as being available for Boston.

The Massachusetts experts unanimously testified that the collection of small supplies from so many sources involving so much pumping made an undesirable and impractical scheme. Doctor Rudolfs, an expert for Connecticut, conceded the force of this and expressed his preference for one point of intake as being much simpler. Doctor Gregory of John Hopkins, one of the leading experts called by Connecticut, said "Other things being equal I think it is simpler to operate a works where you have a large unit than a number of small units." Professor Winslow called by Connecticut also said that to his mind the sounder plan is development of the Merrimack river.

Frank A. Barbour, an engineer of large experience specializing in water supplies and sewage, as a witness for Massachusetts said:

> "As presented by Mr. Jacobs in the order of their proposed development, the scheme included the filtration of the South Sudbury River, the Shawsheen-Ipswich development, and third the Lower Sudbury-Hobbs Brook development. Fourth, the headwaters of the Assabet and the filtration of the Wachusett supply. In the first place it is obvious that this project is to be substantially discounted by the multiplicity of sources and the resulting burden of coordinating them in actual use. The complete project involves 13 different new catchment areas; two on the Shawsheen, one on the Ipswich, one on the Lower Sudbury, and nine on the Assabet. It involves nine new pumping stations widely separated; it involves four filtration plants, also widely separated; of the 58.8 square miles of watersheds in the nine little Assabet developments the run-off of 45.9 square miles, or about 80 per cent, is to be pumped, and only the run-off of 12.9 square miles, reaches the Wachusett aqueduct by gravity. Now this is quite a different development from that suggested by Mr. Stearns in 1895, in which case he was simply going to take such part of the Assabet as would flow into the Wachusett acqueduct

channel by gravity. It is also to be noted that the average head against which the five Assabet pumping stations of 253 million gallons daily capacity must operate approximate 92 feet. That is a pretty high lift for raw water, to lift raw water up into a system. In my opinion, therefore, no detailed analysis is necessary to show that this widely-scattered small unit scheme is substantially discounted in value by that very fact."

This statement of Mr. Barbour is illustrative of the testimony of several witnesses called by the defendant.

In general the Connecticut witnesses regarded this scheme as inferior to taking water from the Merrimack. It seemed to be the view of all the witnesses of both sides that the water obtained under this scheme would have to be filtered or otherwise treated. Doctor Rudolfs testified that he thought the treatment proposed (some storage, filtration and chlorination) would furnish a safe water, but admitted that other things being equal he would prefer a supply of pure water to polluted water.

It is shown that the Ware-Swift water from the standpoint of quality and the Ware-Swift project from an engineering standpoint are much superior to the plan in question. The Swift river basin is an ideal site for a reservoir to hold 380 to 420 billion gallons. This large holding capacity can be secured by flooding a minimum quantity of cheap land and by a dam of minimum cost. The population of the Swift-Ware district has for a considerable time been decreasing. It is a sandy, rough and barren country. The waters are of good quality.

Several of the Massachusetts witnesses testified that the whole district in question from the Assabet to the Ipswich is so close to Boston as to be certain to have large increases in population. Mr. Barbour thought a supply of soft water could

be obtained from this project but it would be "a supply which carries the necessity of continuous high-grade supervision as it is open to all the hazards involved in the human factor. * * * There will be tastes and odors periodically which will make the supply decidedly less acceptable than if obtained from the Ware and Swift." Mr. Eddy of Boston, a well known engineer, testified that the plan was distinctly superior to the Merrimack as to quality of water. But he regarded it as an inferior source compared with the Ware-Swift, a source which is going to be extremely difficult to maintain at anything approaching satisfactory sanitary conditions in the future. James F. Sanborn, for 13 years an engineer for New York in developing the Catskill water supply, testified that the waters involved are open to the general objection that they are already well polluted and with an increasing population there will be a constant tendency to increased pollution, which he said meant that the population would probably be faced with abandoning some of the areas after a few years. He objected to the multiplicity of small units because it involved the human equation in so many portions of its operation.

It is recognized and admitted by Massachusetts that there is available on the nine Assabet watersheds a certain quantity of water, but Mr. Kennison, the Designing Engineer of the Metropolitan District Water Supply Commission for many years, intimately acquainted with these waters, said it was possible to take some of the Assabet headwaters, but recommended they should be regarded solely as an emergency source capable of producing only between 11 and 15 million gallons a day (instead of 35 million gallons a day as estimated by Mr. Jacobs). He and Mr. Westen Fuller said that the population about these waters was sure to increase. It also appears that there are important factories at Maynard and one or more other

points below the diversion which depend on the Assabet for process water, and whether the proposed diversion would infringe on their requirements was left by the testimony quite uncertain.

Objection was urged by Massachusetts civil engineer witnesses to the reservoirs proposed on the Ipswich, the reason being that they would be located upon the Wenham swamp. A swamp or peat bottom is regarded by the Massachusetts witnesses as highly objectionable because of its tendency to cause leakage, to create color in water and encourage growth of weeds which makes filtration difficult. Testimony was given for Massachusetts that the Ipswich water handled as proposed would be relatively of a high color and objectionable from the point of odor and taste. Also that a large algae growth was to be expected which would involve treatment of the water with copper sulphate, possibly several treatments during a year.

The surrounding territory (Manchester, Gloucester, Rowley, and Newbury for example) is growing rapidly owing to good roads and increased use of automobiles. One town, Wilmington, has increased 50% in the last five years. Mr. Weston Fuller and other witnesses thought it a great mistake to develop the Ipswich supply for Boston and vicinity on account of the dense population immediately in and adjacent to the watershed and about the proposed reservoir. Some of the witnesses definitely stated that this supply, if developed, would in their judgment have to be abandoned or curtailed before many years because of the hazard from pollution.

Like objections were raised to the Shawsheen water, i. e., the presence of swamps and the increasing population.

The increased South Sudbury yield estimated by Mr. Jacobs as 17,000,000 gallons was subjected to the same general criti-

cism. An automobile trunk line from Boston to Worcester runs through the area and another road between the same points runs very close to it. The Boston & Albany Railroad runs through the center of the lower portion of it. It is very swampy and yields a highly colored water. This source of supply, once used, has already been abandoned by the Boston Metropolitan District because of the large population upon the watershed and the consequent pollution.

The lower Sudbury-Hobbs Brook development was subject to similar criticism. This water is in a district of towns and growing population. The present population was said by Mr. Goodnough to be 800 per square mile. Such towns as Framingham are in this watershed and the opinion was expressed that Framingham would soon greatly increase in population.

I find from the evidence on this subject that whilst Boston might make available a considerable amount of water from the sources referred to and in the manner referred to, or in some other manner, most of the water is of a quality much inferior to the Ware and Swift and that the project is inferior from an engineering standpoint to the reservoir and tunnel which the Ware-Swift development involves. It is also I think certain that whatever water might be realized from the sources in question would be in the first place an inadequate supply and fill only a part of the requirements, and would be in the second place a supply largely of uncertain duration which in whole or in part might have to be thrown away in the future.

MERRIMACK RIVER PLAN.

Coming now to the second plan presented by Mr. Jacobs, namely, that of taking water from the Merrimack. In listening to the Connecticut experts about the fifteen watershed plan, one could not but feel their lack of enthusiastic sup-

port for that plan. It is quite the contrary when we come to the Merrimack. The Connecticut water experts, and they are men of the highest qualifications and character,—Professor Winslow, Doctor Gregory, Doctor Rudolfs, and Major Whitman,—whole-heartedly endorse the Merrimack as a water supply for Boston. And on the other hand as many witnesses of equally high qualifications and character called by Massachusetts utterly condemn the Merrimack. I think the experts on water and pollution called by the plaintiff and defendant are equally competent and honest in their views. The difference between them seems partly to be a difference between two schools of thought. One looks most favorably on the sinner repentant, the other will have none of him except on compulsion. The one school has the fullest confidence in the processes involved in modern treatment of polluted water and lays less stress on pure source of supply. It suffices them to feel that water will be delivered to the consumer pure. The other school is skeptical about the infallibility of water purification processes and seeks waters that are pure at the source. They advise all cities and municipalities to obtain pure waters wherever practical instead of treating polluted waters.

Mr. Barbour had this to say about the Merrimack:

> "A. I think the first thing that stands out in the use of the Merrimack is the necessity of taking it immediately below the New Hampshire line, which at once emphasizes the fact that it is taken at a point where Massachusetts has no control over the amount of sewage or industrial waste which may be admitted to the stream. I take it there is not much necessity of emphasizing the population in the Merrimack Valley, but in 1920 there were some 350,000 people, of which 130,000 were in the three cities of Nashua, Manchester and Concord, located on the main stream at

distances of 20, 25 and 45 miles above the proposed intake, and all of the discharge of these cities enters the stream without treatment.

"Q. When you say 350,000 population, you are referring to the portion of the watershed above the intake? A. Above the proposed point of intake at Tyng's Island.

"Q. Have you any idea of what that population may be in a reasonable period of years? A. I think half a million people would be entirely reasonable to estimate within a period which might well be taken into account in the present case.

"We have knowledge of some 75 plants on the river, 25 paper mills, three tanneries, one rendering works, two cellulose products works, 11 cotton mills, 25 woolen mills and eight gas works. That, of course, does not include all such plants, as we have not had the opportunity of making a complete checkup. The majority of those plants are in New Hampshire.

"We, therefore, start with the Merrimack as a stream highly polluted by sewage and industrial wastes, the control of which lies in another state, and the proposed intake being immediately below the state line.

"Q. What is your opinion as to the prospect of change in the volume of pollution in the next 40 years, say? A. I cannot see it in any other way than that there will be a normal increase in pollution.

"Q. What is your judgment about the economic utilization of such a river as the Merrimack for industrial purposes? A. I think the Merrimack must always be a drainage artery. It has always been so recognized. Such recognition has been registered by the Massachusetts Legislature in taking this stream out of the control of the State Department of Health within the limits of Lowell. I believe that tendency and the economic necessity require that rivers shall be recognized as carriers of waste within certain limits."

Elsewhere in his testimony Mr. Barbour condemns the proposed reservoir at Foster-Martin ponds and those on the Ipswich.

He says the best modern practice is to choose where possible headwaters of streams instead of the lower polluted waters and names cities which have acted on this theory. He further says about the Merrimack supply:

> "Q. Now as to the working operation of the various works designed for this treatment, what is your opinion as to the probable results? A. I think that with 100 per cent success in operation the plant will give an entirely safe water, a water that outside of the danger of these organic tastes and odors, which periodically will make the water unacceptable to the consumer, that a safe supply and an acceptable supply outside of those periods can be furnished. I think that the project is open, because of the particularly polluted character of the water, is open to always-existing objection or danger of breakdowns in the filter plant. Such things do occur both in the operation of filter plants and in the chlorination process. Within a month we have had a shut-down of ten days at Cambridge right out here a few miles from where we are sitting, due to a breaking of a force main at the plant, entirely out of the control of the operator of the plant. The plant was shut down for ten days.
>
> "Q. What do you think of the chances of 100 per cent operation efficiency? A. I think that is not possible.
>
> "Q. Is that more serious in the case of water requiring all this treatment than in the case of a water of purer quality to begin with? A. That is of course obvious, that the necessity for the highest degree of supervision and success in operation depends on the degree of pollution of the raw water."

and elsewhere:

> "A. I think it is entirely possible to get a safe water from the Merrimack River by the proposed treatment, as-

suming the highest grade of supervision. I think there is a a danger of break-down, perhaps at long intervals, whereby there might be more water get by that would not be safe.

"I think there will be, during the summer season, the continued probability of tastes and odors which would make this water unacceptable intermittently, to the consumer. I think there is a particular danger of industrial waste on the Merrimack River which, if they do not exist today, may develop at any time and which will produce tastes and odors which are very difficult to remove by treatment and which are simply emphasized by chlorination, due to the formation of chloro phenols, which are even worse than the original taste and odor.

"I think the Merrimack-Ipswich scheme involves to a maximum degree the human factor and, in point of comparison with the Ware-Swift, as an operating plan, they are not in the same class and cannot be made so."

Mr. George W. Fuller said:

"The Master: I would like to know directly, in your own way, what you think of the Merrimack river supply for the Boston Metropolitan District.

"The Witness: I think it is a very poor one. I find it has weak links that you could not control at all times, and when those links give away you are going to give them unsatisfactory water, and it is also a more expensive supply, in my opinion, than the Ware-Swift proposition.

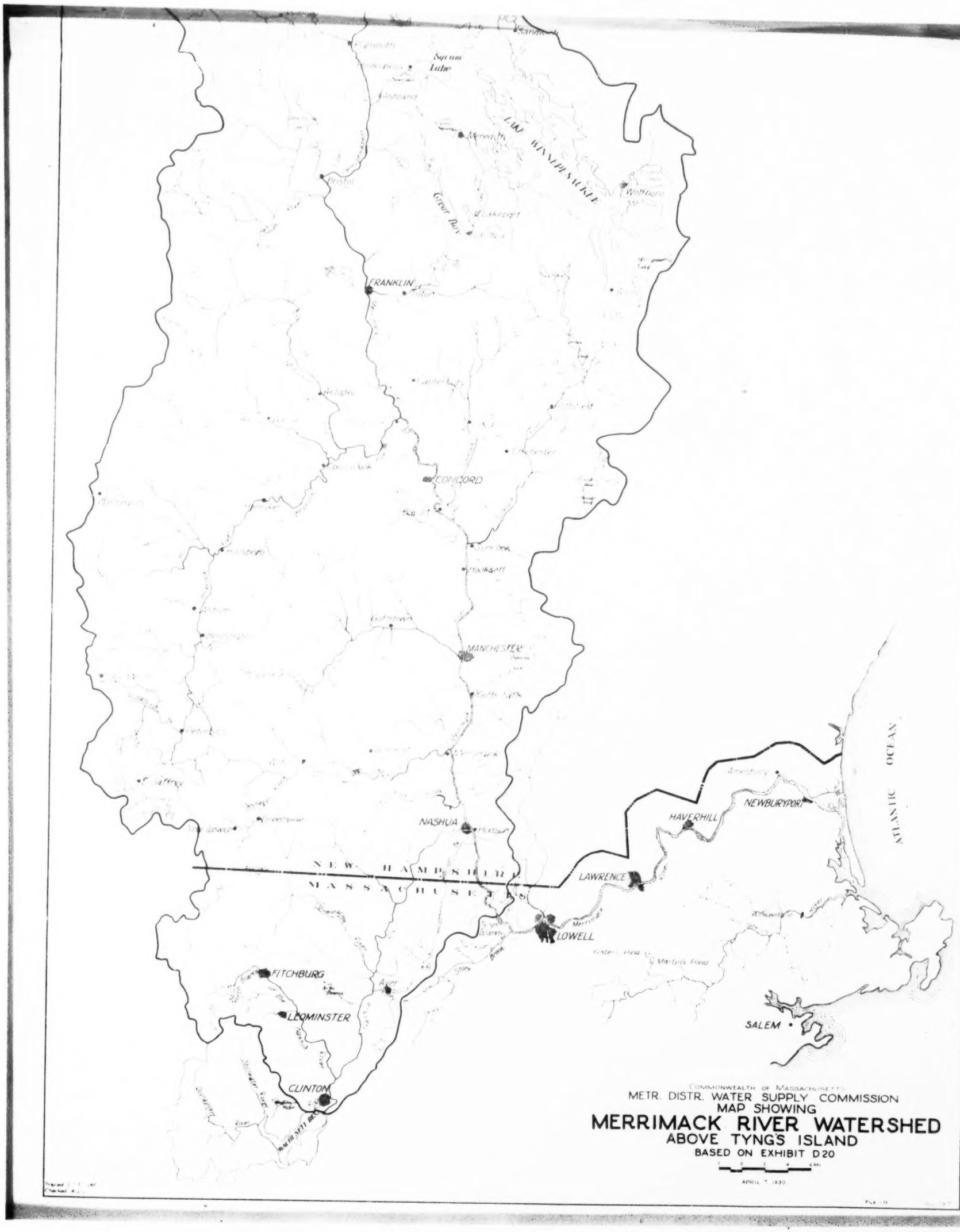
"The Master: Looking at the future, 30 years ahead, and considering the Merrimack with reference to that feature, what do you say?

"The Witness: Well, I think that it becomes then less and less desirable because here is a valley which has been devoted exclusively to various industries, which has an established labor market, an established set of facilities for mills and water power, and it seems to me it is bound to grow, that labor market is not going to go by unoccupied, and what those particular waste products may be, I don't know. Therefore, there is a question of doubt in my mind

as to whether you can get a suitable water supply, from the Merrimack river. But I am not looking at that, your Honor, from a standpoint of what happens within 60 or 90 or four months or six months storage reservoirs; but what will happen when those reservoirs are not behaving well and you get these slugs and paper mill wastes or other trade wastes washed out from behind these mill dams, and getting down to a point where they will actually overtax the facilities which are now available for purifying the water. In other words, it is not the average, ordinary, every day problems of treatment works in connection with storage reservoirs receiving water from the Merrimack river at Tyng's Island. It is a question in my mind what are those weak links when you get a breakdown in the process and you give the people, by getting objectionable tastes and odors, water that is uncoagulated, in getting it markedly unsatisfactory to the consumers of the Metropolitan District, and I don't believe it is possible for anyone to say that they can be reliably treated. That is exactly the point that I want to stress in regard to these weak links, these lacks of performance of the human element, the lack of fidelity in human performance, when the sleepy man at 3 o'clock in the morning lets things go wrong; the lack of jurisdiction in New Hampshire of Massachusetts; the lack of control of industrial wastes. Obviously the industrial establishment is going out in trade in a competitive way and using dye products and arrangements which will let them use their industry to advantage. They are not going to control those wastes as a thing, practically speaking, that is reliable.

"The Master: You don't disagree with the witnesses who have testified that from a scientific view it is entirely possible to make a wholesome water out of the Merrimack flow?

"The Witness: Well, as a sunshiny day problem when everything goes fine, I will say I do agree, but I don't think that enough significance has been attached to the weak link when the stormy and bad-acting periods come"


Squam Lake
Ashland
Meredith
LAKE WINNIPESAUKEE
Bristol
Great Bay
Wolfboro
Lakeport
FRANKLIN
Tilton
Canterbury
Pittsfield
Chichester
CONCORD
Hooksett
Goffstown
MANCHESTER
Merrimack
NASHUA
Hudson
NEW HAMPSHIRE
MASSACHUSETTS
LAWRENCE
HAVERHILL
NEWBURYPORT
Amesbury
ATLANTIC OCEAN
LOWELL
Merrimack
Martin's Pond
FITCHBURG
Ayer
LEOMINSTER
CLINTON
SALEM
COMMONWEALTH OF MASSACHUSETTS
METR. DISTR. WATER SUPPLY COMMISSION
MAP SHOWING
MERRIMACK RIVER WATERSHED
ABOVE TYNG'S ISLAND
BASED ON EXHIBIT D20
APRIL 7, 1930

Washington
Antrim
Hillsboro
Henniker
Webster
Bristol
Plymouth
Woodstock
Lincoln
Franklin
Tilton
Great Bay
Squam Lake
Meredith
Lake Winnipesaukee
Wolfboro
Sandwich
Chichester
Pittsfield
Suncook
Hooksett
Goffstown
Bennington
Peterboro
Merrimack
Goffs Falls
MANCHESTER
CONCORD
Canterbury
Amesbury
NEWBURYPORT
OCEAN

The Merrimack is a polluted river. It drains a large watershed mainly in New Hampshire but partly consisting of the Nashua watershed, the major part of which is in Massachusetts. Opposite this page is a map of the Merrimack and its valley. It is a district of large population and enormous factory development, the larger part of which is in New Hampshire. There is no question about the pollution of the water. There is no certainty of its improvement and no certainty that it will not become more polluted.

I have been much interested and impressed by the evidence of the water experts which puts it beyond question that polluted water by proper treatment may be made hygienic. The experfts convince one that even sewage by proper treatment makes an innoxious beverage.

Also I find, and there is no dispute on the subject, that many cities of Europe and of this country are using water probably as heavily charged with pollution as the Merrimack. London, England, Louisville, Cincinnati, St. Louis, Kansas City, New Orleans, are among these cities. But only one city was mentioned (Lawrence, Mass.) which uses polluted water when it can get a pure supply.

Among the reasons for thinking that the pollution of the Merrimack is unlikely to decrease is the testimony of officials of New Hampshire. For example Charles D. Howard, Chief of the Division of Chemistry and Sanitation of the New Hampshire Board of Health, testified that there had been an unwritten but well understood public policy in New Hampshire, that the communities and industries of the state should not be burdened with the treatment of sewage or industrial waste. The Merrimack river has thus become a legalized public sewer. The conditions in this respect are practically beyond the control of Massachusetts as water taken from the Merrimack

would be taken out at Tyng's Island about midway between the city of Lowell in Massachusetts and the New Hampshire line.

A considerable amount of industrial waste from such factories as paper mills, tanneries, rendering works, cellulose plants, cotton mills, wollen mills, gas works, of which there are many in New Hampshire, is peculiarly difficult to eliminate from water.

It is agreed by all the witnesses that Merrimack water needs modern treatment to qualify it for drinking. The process involved was described by Mr. Jacobs and all the experts accepted his statement. The treatment of such waters consists of several processes. First long storage (30 to 90 days in a large reservoir), next aeration, then chemical treatment for coagulation, then filtration and chlorination. Water is aerated by throwing it into the air or running it over falls or rapids. Chemical treatment for coagulation consists in adding lime and sulphur which form a hydrate that attracts both bacteria and particles. It also is useful to improve color. Filtration involves a separate reservoir or set of reservoirs in which water is passed through gravel and sand. Finally the water is chlorinated and stored for delivery.

Every expert agreed that by treatment on the general lines indicated the Merrimack water could be made hygienic.

The first and one of the most important objections is that these treatment processes introduce a human element subject to all the weaknesses and failures of human nature. The experts who spoke for Massachusetts gave instances of disastrous breakdowns in such processes in the past and stressed the danger, although small, involved in every elaborate system of water purification. The witnesses for Connecticut put less stress on the possibility of failure in the purification operations, but all of them with the possible exception of Professor Winslow

stated that where two sources are equally available, one polluted the other clean, the clean water ought to be chosen.

The Connecticut experts except Professor Winslow expressing preference for a supply of pure water over a polluted supply, also said that public opinion has to be considered and sometimes is controlling; that is that a settled opinion (it may be prejudice) is to be regarded. Professor Winslow said that as a water expert he would take no account of public opinion or prejudice, confining himself on the contrary to the bare question of the quality of the water ultimately offered the consumer. The experts called by Massachusetts in addition to expressing the most decided opinion in favor of securing pure supplies of water wherever possible, agreed that considerable weight had to be given by engineers, by water boards, and by municipal authorities to any general and settled public opinion. Morris Knowles of Pittsburgh, senior member of the firm now employed by Connecticut and proposing Merrimack water, was employed by the city of Lawrence in 1917 to recommend supplies of water and in this letter to the city said this:

> "As a source of water supply the Merrimack * * * is grossly polluted now, and will probably continue to become more polluted as time passes. Under present conditions its purification is incomplete and is attended by certain lapses, which at numerous times in the past have reached a disquieting if not a dangerous stage. Although this supply can be artificially treated and purified so as to be perfectly safe to drink, the weight of disfavor against the stream as a source of supply has become so great and so real as to actually obliterate any economy in its use.
>
> We therefore recommend that the Merrimack River be abandoned as a source of water supply for Lawrence."

Taking of water out of the Merrimack must be by pumping. The water is to be pumped by two pipes to Foster-

Martin pond reservoir, and if combined with the Ipswich to an Ipswich reservoir, and then pumped to the delivery reservoir Spot Pond. Much testimony was devoted to cost of the proposed supplies from eastern Massachusetts compared with the cost of the Swift-Ware development. So far as cost is concerned there is no vast difference between the schemes and any of them is within the means of Massachusetts. Every scheme proposed for taking from the eastern part of the state involves pumping and other works which are subject to considerable deterioration and some possibility of breakdown. In every estimate of cost the largely increased operating expenses of the alternative plan were capitalized to make a fair comparison with the Ware and Swift enterprise, where depreciation and operating costs would be very small. The Ware-Swift enterprise consists mainly of a tunnel and an enormous reservoir. The water moves entirely by gravity. The possibility of breakdown in such works is practically nil and the depreciation negligible.

The Merrimack is a small river compared with the Connecticut. 200,000,000 gallons a day would be about one-quarter of its daily low stage flow. There are large factories at Lowell and Lawrence, a little below the proposed take-out which it is claimed would be extensively damaged, or possibly put out of business, by the proposed diversion. The owners of these factories were not witnesses and the testimony of the engineers who were examined is in conflict as to the extent of this damage. The testimony does not enable me to make a definite finding thereon but I think there is a probability of this damage turning out to be serious to the existing factories and future factory operations at Lowell and Lawrence.

The Merrimack is a navigable river from Haverhill to the sea. The United States has a right as I think to regulate such

a diversion at Tyng's Island as is proposed. What the Secretary of War would say about it I cannot predict. Some of the experts called by Massachusetts took the view that the Secretary would certainly materially diminish the 200,000,000 gallons a day proposed to be taken. They say the Secretary of War doubtless would restrict the diversion on the same principle he applied to the Ware and Swift, namely, by limiting the diversion to flows in excess of .6 of a second foot per square mile of drainage area. I have no means of finding what the Secretary would do, but I think the navigation is important enough (and there are projects to improve it) to justify the conclusion that 200,000,000 gallons a day cannot with certainty be taken by Boston at Tyng's Island.

On the assumption that the Secretary of War would cut down the proposed diversion of the Merrimack at Tyng's Island on the basis suggested by the Massachusetts experts, a plan was presented (defendant's exhibit 25) for combining some diversion of the Merrimack with Ipswich river water in two reservoirs at the Ipswich shown on the exhibit. This plan was designed to produce from the Merrimack and Ipswich combined 191,000,000 gallons a day, the same as the Ware-Swift plan.

I think it apparent from the facts before stated that the effort of Connecticut to prove good and sufficient supplies of water in eastern Massachusetts, in spite of the decision of the Massachusetts legislature takes us very far afield. It is certain that the supply in northeastern Massachusetts of pure water is perilously near exhaustion. It is clear that the Metropolitan District cannot reach out and lay its hands on northeastern Massachusetts supplies without regard to the whole population which must obtain water from one source or another. Connecticut in this respect is calling on the Supreme Court of the United States to determine how much water supply is now

available and will continue available for a long period of time for the inhabitants of the whole northeastern part of Massachusetts; to determine how much of this water is fit for human use and will remain so for a long period of years; to say how much of it ought to be fitted for use, involving cost and expense of fitting reasonable to be imposed on the public; and to divide the supplies among the towns and cities and other communities of the region.

These questions are engineering and governmental and much fitter to be decided by the cities and towns concerned than by any court. But the questions are only suggestive and whoever passes on them will be taken still farther afield. For example it appears in the evidence that the city of Lawrence, Massachusetts, is the only town using Merrimack water for drinking. The result is a most extraordinary sale of bottled water in Lawrence. It is delivered generally like milk. 1916 statistics showed that the amount of money paid in Lawrence for bottled water was 55 per cent of the total amount paid for public water for all purposes. To force people to bottled water is not conducive to the public health. Such facts as those about Lawrence also show a reason why public opinion ought to be regarded in selecting water supplies.

It seems to me that in determining a water supply due regard must be given to public opinion. Undoubtedly the Ware and Swift acts expressed the settled public opinion of the Boston District and of the state. Up to now the Metropolitan District has been using waters of fair purity; at least waters that have not yet required elaborate treatment to fit them for drinking. The people of Massachusetts are not accustomed to fitting by modern treatment badly polluted waters. It is natural that such people should have a peculiar hostility to polluted water. Our governments in the long run are controlled

by public opinion. And while an expert on water, acting in a strictly professional capacity, may say that he will disregard public opinion, municipal and other governments cannot take that stand. The courts it seems to me cannot close their eyes to the necessities imposed by public opinion on governments. Having found on the first branch of the case that Connecticut will not be substantially and seriously injured by the Ware-Swift diversion and the people of Massachusetts having made their decision in favor of the Ware and Swift, conceding that it is open to Connecticut to ask this court to overrule the Massachusetts determination and relegate Boston and the Metropolitan District to the water supplies in the eastern part of the state, certainly the burden is on Connecticut to make a peculiarly clear and conclusive showing. I content myself with finding that no such showing has been made. Giving the proof of Connecticut the utmost weight it no more than raises a doubt. The objections are too important and too many to the water supplies of northeastern Massachusetts to warrant a decree that Boston and the surrounding district are bound for the present and during the future to rely on the polluted waters of the Merrimack for drinking water.

On this branch of the case I have quoted from Mr. Barbour and Mr. Fuller, two of the Massachusetts experts in order to give a fair illustration of the defendant's testimony and have tried to state fully their contentions, without intending to find that these contentions are right and the Connecticut witnesses wrong.

It seems to me the court upon the evidence given cannot undertake to administer the internal affairs, including water supplies present and future, of northeastern Massachusetts.

I find the taking from the Merrimack ought not to be imposed upon the Boston District. Because first the water is a polluted

water and Massachusetts has no adequate control of the pollution or adequate remedy to cure it; that the water is of quality much inferior to the Ware and Swift and the proposed project inferior from an engineering standpoint to the reservoir and tunnel which the Ware and Swift development involves. I find that the two reservoir sites, Foster and Martin's pond and Ipswich site are much inferior to the dam site at the Swift. The bottoms of these ponds are partly marsh or peat and some of the inclosing walls are of great length. I think there is danger that the proposed abstraction will work an important and undetermined damage to present and future factories both at Lowell and Lawrence. I find that the proposed take-out is of such a large part of the river flow that a substantial reduction of it by the Secretary of War is probable. I find generally in respect both of the Merrimack diversion and the 15 watershed plan that the waters for the most part are polluted and require substantial and extensive treatment by some or all of the modern methods and that in many ways it is most advantageous to obtain a source of pure supply wherever reasonably possible.

III.

(a) I have not gone into the comparative cost of the various projects because I think it is immaterial. There is no such wide divergence in cost as to make it a determining factor.

(b) I have disregarded entirely, because it seems to me immaterial, a large amount of testimony on another line. It was contended by Connecticut that the Ware and Swift scheme was simply an entering wedge to the drafting of added waters in the future from the Connecticut valley; and proof was offered of previous proposals in Massachusetts reports and documents to take water from the Millers river and other Connecticut

tributaries. It was sought to prove that the tunnel from Wachusett to the Ware and beyond to the Swift was larger than necessary to carry the 191,000,000 gallons a day and that this must be for the purpose of taking added water in the future. I disregard such evidence altogether as it seems to me immaterial. The Massachusetts legislation confines itself to taking certain waters from the Ware and Swift. The Secretary of War has imposed additional limitations. Massachusetts says she intends to divert no more water than the Secretary of War permits and in every way to follow the conditions he imposes. It is true that counsel in this case cannot control the future action of Massachusetts. But it is sufficient for this case to say that injunction should not issue against something merely feared at some indefinite time in the future. Injunction issues to stop present injuries or those presently threatened. The judgment in this case, if it goes in favor of Massachusetts, should settle her right to take only so much water and in such manner and at such times as the Secretary of War permits. It will in no way bar or diminish the right of Connecticut to proceed against the taking of additional future water. For this reason I disagree with the suggestion advanced by Connecticut on the hearing, that she is entitled at least to an injunction restraining Massachusetts from taking any more water than the Secretary of War has authorized. As there is no threat on the part of Massachusetts to do that, such an injunction does not seem to me proper.

(c) It may be suggested that Massachusetts has lost rights which she otherwise might have had by having herself allowed her eastern waters to be polluted; and that she cannot profit by a necessity for Ware-Swift water which she herself has created. This is not the case of a plaintiff coming into equity where he must come with clean hands. But perhaps the principle of

coming in with clean hands may sometimes be applicable to a defendant. If Massachusetts were grossly at fault in polluting her eastern waters so that they were unfit for use and that was the only thing which created the need for Ware-Swift waters, I should feel she might be held to pay the price of her own wrong-doing.

However, her practice has not been different from that of Connecticut and other New England states and it is a matter of notoriety that it is not different from the practice which has prevailed on other rivers and in other parts of our country. The pollution of our country's rivers makes a pitiable record. I think Massachusetts should not be penalized in this fashion for following a practice which has been almost or quite universal in the United States. It is to be noted too that the more important supply, the Merrimack (the other supply being at best insufficient), is polluted in major part by New Hampshire population and factories.

(d) It seems to me the decree should be; dismissing the bill with a provision that if (say within ten years) a dam at or near King's Island on the Connecticut is built to develop substantially 50,000 horse power, Massachusetts pay the owners of such dam and power the sum of $80,000.00.

CHARLES W. BUNN.

FOLD-OUT IS TOO LARGE TO BE FILMED

CORRECTED COPY

SUPREME COURT OF THE UNITED STATES.

No. 12, Original.—October Term, 1930.

State of Connecticut, Complainant,
vs.
Commonwealth of Massachusetts, Defendant.

[February 24, 1931.]

Mr. Justice Butler delivered the opinion of the Court.

The State of Connecticut brought this suit against the Commonwealth of Massachusetts to enjoin her from diverting waters from the watershed of the Connecticut river to provide water for Boston and neighboring cities and towns.

Legislation of Massachusetts authorizes diversion into the Wachusett reservoir of the flood waters of the Ware river, c. 375, Laws 1926, and of certain waters of the Swift river, c. 321, Laws 1927. The watersheds of these rivers are about midway between the Boston district and the westerly boundary of the Commonwealth. They are tributaries of the Chicopee; all are non-navigable streams wholly within Massachusetts. The Chicopee empties into the Connecticut just above Springfield. The latter rises in Canada and northern New Hampshire. It flows between New Hampshire and Vermont through Massachusetts and Connecticut into Long Island Sound. It is about 345 miles long and drains 11,300 square miles of which 1,385 are in Connecticut.

The complaint alleges:

Connecticut and Massachusetts recognize the common law doctrine that riparian owners have the right to the undiminished flow of the stream free from contamination or burden upon it. Connecticut appears as owner of riparian lands and of the bed of the river and as *parens patriae*. The proposed diversion will take water tributary to the Connecticut entirely out of its watershed, will impair navigability of that stream, will take flood waters and thereby cause damage to agricultural lands that are subject to yearly inundation. The Connecticut is now heavily burdened with

offensive matter put into the river in Massachusetts and requires all the water that naturally comes down the river to prevent it from becoming a nuisance and menace to public health. The diversion will destroy property of Connecticut and of its inhabitants without due process of law and cause injury for which there is no adequate remedy at law. The diversion presently proposed is only a portion of that covered by the plan adopted by Massachusetts which includes the acquisition of the waters of other tributaries of the Connecticut.

By its answer and amendments thereto Massachusetts denies that the proposed diversion will cause any injury or damage, and avers that the amount of water to be taken is negligible when compared with the flow of the river where it enters Connecticut, that an emergency exists in Massachusetts constituting a justification for a reasonable use of such waters, that the serious injury to the people of the Commonwealth if diversion be prohibited compared to the trivial damage possibly caused to Connecticut and its people if diversion is permitted should lead a court of equity to give substitutional relief rather than that specifically prayed, that Connecticut's contention that the diversion will interfere with navigation is not open in the absence of proof that Massachusetts has diverted or actually proposes to divert more water than is permitted by the War Department, that the proposed diversion is in all respects a reasonable use of the waters in question and that the project will stabilize the flow of the river and result in benefit to Connecticut and the lower riparian owners.

By its reply, Connecticut denies Massachusetts' affirmative allegations and alleges that there is no necessity for the diversion and that there is an adequate supply of water in the eastern part of Massachusetts.

The court appointed Charles W. Bunn of Minnesota as special master and authorized him to take and report to the Court the evidence together with his findings of fact, conclusions of law and recommendations for a decree. The master filed his report and the evidence introduced by the respective parties. It shows that he heard arguments in their behalf, and sets forth his findings and conclusions with a recommendation that the bill be dismissed and that (if it be held that lack of present purpose further to develop power at King's Island does not warrant denial

of injunction on that ground) the decree contain a provision for the protection of the owner of the dam and power at that place. Connecticut filed numerous exceptions. Massachusetts made no objection to the report. The Court has heard the arguments of counsel and considered their briefs for and against the exceptions and upon the final submission of the case.

The report shows that Connecticut sought to prove that any subtraction from the flow of the Connecticut river through that State will cause serious damage to the State and its people in that it will impair the navigability of the stream, lessen productivity of river bottom lands by diminution of inundation during times of high water in each year, diminish the power capable of development at King's Island, diminish the run of shad in the river and decrease its capacity to discharge and destroy sewage.

The brief substance of the master's findings of fact follows:

Boston and the surrounding metropolitan area are faced with a serious water shortage in the near future and there is need for a large quantity of additional water. That district includes 35 cities and towns having a population of 1,900,000. Other nearby cities and towns are likely in the future to depend on that district for water supply. The total population concerned is now 2,860,000 and it is estimated that it will reach 4,572,000 within forty years. There is no serious dispute about the need of the region to provide presently for additional water.

Massachusetts applied to the Secretary of War (Act of March 3, 1899, § 10, 30 Stat. 1151) for authority to make the proposed diversions. After hearing both sides and examining the facts, the Secretary permitted diversion of the flood waters of the Ware in excess of 85 million gallons per day between October 15 and June 15 and prohibited the taking of any water except during that period. He permitted diversion of all waters of the Swift except enough to maintain a flow therein of 20 million gallons per day; but he required that, during the period from June 1 to November 30 there shall be released from the impounding dam 110 cubic feet per second (71 million gallons per day) whenever the flow of the Connecticut at Sunderland, Massachusetts (a town 20 miles north of the confluence of the Chicopee and Connecticut) is 4650 cubic feet per second or less, and 70 cubic feet per second (45 million gallons per day) when the flow is more than 4650 and

less than 4900 cubic feet per second. The Secretary found that the discharge at Sunderland of 4650 cubic feet per second corresponds to an average gauge height at Hartford of two feet and that a discharge of 4900 cubic feet per second corresponds to 2.1 gauge height at Hartford.

The annual flow of the Connecticut at the Massachusetts-Connecticut boundary is about 17,000 cubic feet per second, approximately 11,000 million gallons a day. The watershed above that boundary is 9,915 square miles. The drainage of the Ware at the point of diversion on that river is 98 square miles and that of the Swift at the point of diversion is 186 square miles. The diversion permitted by the Secretary will furnish about 191 million gallons per day. The Massachusetts Acts do not authorize the diversion of any waters other than the Ware and Swift and as to these the record shows that (as far as counsel can commit it) Massachusetts proposes to abide by the War Department requirements and restrictions.

The total area subject to such diversions is 2.93 per cent. of the watershed above Connecticut. The permitted diversions represent an average yearly subtraction from the flow of the Connecticut at the state line of about two per cent; but 94 per cent. of this occurs when the Hartford gauge reads above 3.5 feet which means 11.5 feet depth of water. The Government has heretofore sought to maintain 10 feet of water below Hartford. A War Department project contemplates a 12 foot channel. (On that bottom level, 3.5 feet on the gauge would mean 13.5 feet of water.)

Dredging is required every year to maintain a channel of 10 feet over numerous bars below Hartford. Navigation is difficult when the depth falls below 10 feet. There is no difficulty when there is 12 or even 11 feet. The required release of water from the Swift river reservoir during periods of low water will somewhat benefit navigation. The maximum diversions are at high water and lessen depth five to six inches. At medium stages the diversion is less and at very low stages the flow is increased. The diversion will not perceptibly or materially interfere with navigation.

The height of floods will be lessened from one to six inches. Because of the diversion, small pieces of hay land will fail to receive flood waters. It is impossible to determine from the evidence to what extent that will occur. The lessening of spring floods will

have its advantages and disadvantages; it will reduce some damages and increase others. The damage to the hay land is not shown to be of serious magnitude; and, far from being established by clear and convincing evidence, it is not shown by evidence making it possible of computation or proving that it is large.

There is shown one possible development of power. It is at King's Island in Connecticut where 4,000 horsepower is now produced. The owner has been authorized by the Federal Power Commission to build a higher dam to develop approximately 50,000 horsepower. It is not shown that the company has determined so to do, or that the necessary capital has been arranged for. The present use of the water for power purposes will not be disturbed by the diversion. If waterpower shall be developed to the extent of 50,000 horsepower, the diversion will cause an injury of $80,000.

Connecticut failed to establish that the taking of flood waters will be materially injurious to the shad run or that the diversion will perceptibly increase the pollution of the river.

The legislative determination to use the waters of the Ware and Swift was made and the Acts of 1926 and 1927 were passed as the result of long-continued and careful study. Connecticut submits two plans to show that the northeastern part of Massachusetts has abundant supplies of water for the Boston district.

The first involves combining water from 15 watersheds on the Assabet, Sudbury, Shawsheen and Ipswich rivers. The plan involves pumping and also treatment of the water for its purification. From an engineering standpoint it is inferior to that adopted for the Ware-Swift development. And, while a considerable amount of water from these sources may be made available, most of it is of a quality much inferior to the waters of the Ware and Swift. And the amount would be inadequate and constitute only a part of the needed supply. The operation of the plan would be of uncertain duration and might have to be abandoned.

The second plan is based on the taking of water from the Merrimack. That stream drains a large watershed mainly in New Hampshire. It is polluted and the pollution is practically beyond the control of Massachusetts. There is no certainty of its improvement or that it will not become worse. Unquestionably, polluted water may be made wholesome by proper treatment. A considerable amount of industrial waste from mills, cellulose plants,

tanneries, rendering works and gas works, of which there are many in New Hampshire, is peculiarly difficult to eliminate from water. The necessary treatment of waters so polluted involves several processes — storage for 30 to 90 days in a large reservoir, aeration, filtration, chlorination. These introduce a human element subject to weaknesses and failures of human nature. Instances of breakdowns are given. There is a small element of danger involved in every elaborate system of water purification. With a single exception, all the witnesses expressed preference for a supply of originally pure water over a purified polluted one. Lawrence is the only city in Massachusetts using Merrimack water for drinking. It consumes an extraordinary amount of bottled water the cost of which in 1916 was about 55 per cent. of the amount paid for public water for all purposes. The plan contemplates the taking of 200 million gallons per day from the Merrimack at Tyng's Island, just below the New Hampshire line. That is about one-quarter of its flow. Factories below the proposed takeout would be liable to suffer damage from the diversion. The stream is navigable below Haverhill and it is not certain whether the taking of that amount would be permitted by the Government. The master says: "I find the taking from the Merrimack ought not to be imposed upon the Boston District. Because first the water is a polluted water and Massachusetts has no adequate control of the pollution or adequate remedy to cure it; that the water is of quality much inferior to the Ware and Swift and the proposed project inferior from an engineering standpoint to the reservoir and tunnel which the Ware and Swift development involves."

The Massachusetts legislation confines itself to the taking of certain waters of the Ware and Swift. The Secretary of War has imposed additional limitations. Massachusetts declares that she intends to divert no more water than the Secretary of War permits and that she will in every way follow the conditions he imposes.

The exceptions filed by Connecticut need not be set forth or considered in detail. The governing rule is that this Court will not exert its extraordinary power to control the conduct of one State at the suit of another, unless the threatened invasion of rights is of serious magnitude and established by clear and convincing evidence. *New York* v. *New Jersey*, 256 U. S. 296, 309.

Missouri v. *Illinois*, 200 U. S. 496, 521. The burden on Connecticut to sustain the allegations on which it seeks to prevent Massachusetts from making the proposed diversions is much greater than that generally required to be borne by one seeking an injunction in a suit between private parties. *North Dakota* v. *Minnesota*, 263 U. S. 365, 374. There has been brought forward no adequate reason for disturbing the master's findings of fact. They are amply sustained by the evidence and are adopted by the Court.

Connecticut suggests that, under the common law in force in both States, each riparian owner has a vested right in the use of the flowing waters and is entitled to have them to flow as they were wont, unimpaired as to quantity and uncontaminated as to quality. It maintains that the taking of waters from the Ware and Swift infringes vested property rights in that State which cannot be taken without its consent against the will of the owners. And it insists that this Court, following the law enforced by each of the States within its own boundaries, should grant injunction against any diversion from the watersheds of these rivers.

But the laws in respect of riparian rights that happen to be effective for the time being in both States do not necessarily constitute a dependable guide or just basis for the decision of controversies such as that here presented. The rules of the common law on that subject do not obtain in all the States of the Union, and there are variations in their application. The doctrine of appropriation prevails in some States. And every State is free to change its laws governing riparian ownership and to permit the appropriation of flowing waters for such purposes as it may deem wise. *United States* v. *Rio Grande Irrigation Co.*, 174 U. S. 690, 702.

For the decision of suits between States, federal, state and international law are considered and applied by this Court as the exigencies of the particular case may require. The determination of the relative rights of contending States in respect of the use of streams flowing through them does not depend upon the same considerations and is not governed by the same rules of law that are applied in such States for the solution of similar questions of private right. *Kansas* v. *Colorado*, 185 U. S. 125, 146. And, while the municipal law relating to like questions between individuals is to be taken into account, it is not to be deemed to have controlling weight. As was shown in *Kansas* v. *Colorado*, 206 U. S. 46, 100,

such disputes are to be settled on the basis of equality of right. But this is not to say that there must be an equal division of the waters of an interstate stream among the States through which it flows. It means that the principles of right and equity shall be applied having regard to the "equal level or plane on which all the States stand, in point of power and right, under our constitutional system" and that, upon a consideration of the pertinent laws of the contending States and all other relevant facts, this Court will determine what is an equitable apportionment of the use of such waters. *Wyoming* v. *Colorado*, 259 U. S. 419, 465, 470.

The development of what Mr. Justice Brewer, speaking for the Court in *Kansas* v. *Colorado*, 206 U. S. 46, 98, refers to as interstate common law is indicated and its application for the ascertainment of the relative rights of States in respect of interstate waters is illustrated by *Missouri* v. *Illinois*, 200 U. S. 496; *Kansas* v. *Colorado*, *supra*; *Wyoming* v. *Colorado*, *supra*, and *Wisconsin* v. *Illinois*, 278 U. S. 367; 281 U. S. 179. Two of these cases are much like the one at bar.

Kansas v. *Colorado* was a suit to prevent the latter from withholding waters of the Arkansas river from flowing as they were wont through Kansas. The common law rule as to riparian ownership was then generally recognized in Kansas while in Colorado the doctrine of appropriation prevailed. The Court held that the upper State was not entitled to use the waters of the Arkansas flowing therein as it chose regardless of resulting conditions or impairment of the right to the use of such waters in the lower State. It was shown that, without diversion from the watershed, the waters of the Arkansas in Colorado were and for many years had been used to irrigate and make productive what theretofore had been barren lands. It was found that the resulting diminution of the flow of the river caused perceptible injury to a portion of the valley in Kansas but that it had been of little, if any, detriment to the great body of the valley. The Court held (206 U. S. at p. 114) that the rule of equality of right forbade interference with the existing withdrawals of water in Colorado.

In *Wyoming* v. *Colorado* the former sued to prevent a diversion of the waters of the Laramie river which rises in Colorado and flows into Wyoming. Both States are in the arid region and apply

the doctrine of appropriation. Wyoming objected on the ground that the diversion was to another watershed. The Court held (p. 467) that: "The principle of such diversions being recognized in both States, its application to this interstate stream does not in itself afford a ground for complaint, unless the practice in both be rejected in determining what, as between them, is reasonable and admissible as to this stream, which we think should not be done." The problem there presented was expressed as follows (p. 467): "We are thus brought to the question of the basis on which the relative rights of these States in the waters of this interstate stream should be determined. Should the doctrine of appropriation, which each recognizes and enforces within her borders, be applied? Or is there another basis which is more consonant with right and equity?" After an elaborate discussion of the facts, the Court said (p. 470): "We conclude that Colorado's objections to the doctrine of appropriation as a basis of decision are not well taken, and that it furnishes the only basis which is consonant with the principles of right and equity applicable to such a controversy as this is."

It is very clear that, under earlier decisions here, the strict rules for which Connecticut contends are not necessarily controlling in this case. There is nothing in the master's findings of fact to justify an inference that any real or substantial injury or damage will presently result to Connecticut from the diversions by Massachusetts authorized by the Acts of 1926 and 1927 as limited and defined by the Secretary of War. No discussion is required as to the effect of the proposed diversion upon the navigability of the river, agriculture, fish life or pollution in Connecticut.

The proposed taking of the waters of the Swift and Ware will not affect the present dam, works or production of power at King's Island. While the owning company has secured authority to build the higher dam, it has not resolved so to do. It is not found and there is nothing to show that it intends to construct any dam or works of a kind or capacity that, if now in use, would be injuriously affected by such diversion. At most there is a mere possibility that at some undisclosed time the owner, were it not for the diversion, might construct additional works capable of using all of the flow of the river including the waters proposed to be taken by Massachusetts. Injunction will not issue in the absence

of actual or presently threatened interference. The facts disclose no basis for relief in respect of that property. *New York* v. *Illinois*, 274 U. S. 488. *New Jersey* v. *Sargent*, 269 U. S. 328, 331, 338.

Drinking and other domestic purposes are the highest uses of water. An ample supply of wholesome water is essential. Massachusetts, after elaborate research, decided to take the waters of the Ware and Swift rather than to rely on the sources in the eastern part of the Commonwealth where all are or are liable to become polluted. We need not advert to other considerations, disclosed by the evidence and findings, to show that the proposed use of the waters of the Ware and Swift should not be enjoined.

Connecticut maintains that the presently proposed diversion will not be adequate for the future needs of the Boston district and that the size and character of the works as well as legislative reports and other circumstances disclose an intention on the part of Massachusetts, when the need shall arise, to draw from other rivers—Millers, Deerfield, Quaboag and Westfield—tributary to the Connecticut and insists that the decree should restrain Massachusetts forever from increasing its diversion to an amount in excess of what the Secretary of War has already indicated would cause no damage to the navigation of the Connecticut.

The scope of the project is that shown by the Acts as limited by the determination of the War Department. It involves no diversion from streams other than the Ware and Swift. Massachusetts declares that she intends to and must obey these findings of the War Department. Her statements before the master and here clearly negative any threat, intention or purpose to make any diversion of water in excess of that specified or otherwise than as set forth in the determinations of the War Department. Injunction issues to prevent existing or presently threatened injuries. One will not be granted against something merely feared as liable to occur at some indefinite time in the future. *New York* v. *Illinois*, *supra*. *New Jersey* v. *Sargent*, *supra*.

Connecticut's bill of complaint will be dismissed without prejudice to her right to maintain a suit against Massachusetts whenever it shall appear that substantial interests of Connecticut are being injured through a material increase of the amount of the waters of the Ware and Swift diverted by or under the authority of Massachusetts over and above the quantities authorized by the

Acts of 1926 and 1927 as heretofore limited by the War Department. Each party will pay its own costs, one-half of the expenses incurred by the special master and one-half the amount to be fixed by the Court as his compensation.

Counsel for Massachusetts will prepare a form of decree in consonance with this decision and furnish a copy to counsel for Connecticut within fifteen days; and, within ten days after such submission, the draft decree together with suggestions in behalf of Connecticut, if any, will be submitted to the Court.

A true copy.

Test:

Clerk, Supreme Court, U. S.

SUPREME COURT OF THE UNITED STATES.

No. 12, Original.—October Term, 1930.

The State of Connecticut,
vs.
The Commonwealth of Massachusetts.

[March 23, 1931.]

Decree.

This cause came on to be heard upon the pleadings, evidence, and the exceptions filed by the complainant to the Report of the Special Master, and was argued by counsel. The Court now being fully advised in the premises and for the purpose of carrying into effect the conclusions set forth in the opinion of this Court announced February 24, 1931,

It is now here Ordered, Adjudged and Decreed as follows:

First that the Bill of Complaint herein be and the same hereby is, dismissed without prejudice to the right of the complainant to maintain a further suit against the defendant at any time in the future when it shall appear that substantial interests of the State of Connecticut are in fact being injured, or are about to be injured, through a material increase of the amount of the waters of the Ware River and of the Swift River diverted or to be diverted by, or under the authority of, the Commonwealth of Massachusetts, over and above the quantities authorized to be diverted by the provisions of Chapter 375 of the Acts of 1926 and by Chapter 321 of the Acts of 1927 of the General Court of the Commonwealth of Massachusetts, as said quantities have heretofore been limited by two certain findings of the Secretary of War of the United States, acting upon the recommendation of the Chief of Engineers of the United States Army, dated respectively March 14, 1928, and May 11, 1929, and more fully set out in Appendix B and Appendix C of the Reprint of the Answer of the Defendant herein, filed January 20, 1930, and of Record in this cause.

Second that each party shall pay its own costs, together with one-half of the expenses incurred by the Special Master, Charles W. Bunn, Esquire, of St Paul, Minnesota, and one-half of the amount fixed by the Court as the compensation of the Special Master.